Parental distress during the transition to parenthood: a prevention perspective

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Parental distress during the transition to parenthood

A prevention perspective

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VRIJE UNIVERSITEIT

PARENTAL DISTRESS DURING THE TRANSITION TO PARENTHOOD: A PREVENTION PERSPECTIVE

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Voor mijn lieve, dappere, en koppige oma, die me leerde

om altijd weer door te zetten – tegen elke storm in.

COLOFON

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TABLE OF CONTENTS

Chapter 1	General introduction	6
Chapter 2	The work-home interface: the role of home-based predictors of burnout among mothers	24
Chapter 3	The first 12.5 years of parenthood: a latent trait-state occasion model of the longitudinal association between maternal distress and child internalizing and externalizing problems	56
Chapter 4	Universal prevention of distress aimed at pregnant women: a systematic review and meta-analysis of psychological interventions	86
Chapter 5	Effectiveness of a psycho-educational intervention to prevent postpartum parental distress and enhance infant well-being: study protocol of a randomized controlled trial	120
Chapter 6	Effectiveness of a psycho-educational intervention for expecting parents to prevent postpartum parenting stress, depression and anxiety: a randomized controlled trial	148
Chapter 7	General discussion	188
Addendum	Summary	216
	Dutch summary – Samenvatting	222
	Acknowledgements – Dankwoord	230
	About the author	236
	List of publications	238

1

General introduction

"*There seems to be a wealth of non-validated advice. In case of problems with caring for your infant, determining which of these advices to follow is difficult (and also to stick to this advice*)."

One of the mothers (30 years, newborn son) participating in our 'U & uw baby' study

The transition to parenthood is a significant life event, often bringing much joy and happiness, but also challenging parent's available resources. From birth onwards, parents need to adapt quickly to their new reality and learn a range of new skills (Young, Roberts, & Ward, 2020). At the same time, they are confronted with a lack of sleep which can impact on their energy, stress levels, and their ability to be resilient in the face of adversity. Problems in coping with the adaptations connected to parenthood can lead to parenting stress, which might result from an experienced discrepancy between the demands associated with the parenting role and the available resources to fulfil these demands (Abidin, 1992; Leigh & Milgrom, 2008). Indeed, qualitative evidence shows that parents feel overwhelmed by the seemingly unlimited demands that come with the parenting role (Young et al., 2020), and by doubts about their parenting skills (Henshaw, Cooper, Jaramillo, Lamp, Jones, & Wood, 2018; Hong Law, Dimmock, Guelfi, Nguyen, Gucciardi, & Jackson, 2019), which jeopardizes their well-being. The majority of research into the transition to parenthood covers the experiences of women and neglects the experiences of fathers. Therefore, the focus of this dissertation is specifically on both parents, mothers as well as fathers, who are confronted with a significant and life-changing event that turns their world around: the birth of their child. The aim of this dissertation is to identify and describe their levels of distress across the transition to parenthood and to study whether parental distress postpartum can be prevented by intervening already during pregnancy.

Parental distress and the transition to parenthood

With parental distress, we refer to a spectrum of psychological, emotional, and behavioural symptoms in response to the challenges that are associated with the transition to parenthood (Emmanuel & St. John, 2010; Fontein-Kuipers, Ausems, Budé, Van Limbeek, De Vries, & Van Nieuwenhuijze, 2014). Parental distress can express itself from increased worrying and feelings of stress to symptoms of clinical disorders such as anxiety and depression. Prevalence rates for the full spectrum of maternal postpartum distress symptomatology (including milder forms such as frequent worrying) are currently lacking. However, maternal prevalence rates for postpartum depression symptomatology range

between 8 and 40% (Heron, O'Connor, Evans, Golding, & Glover, 2004; Yelland, Sutherland, & Brown, 2010; McCoy, Beal, Shipman, Payton, Watson, 2006; Morris-Rush, Freda, & Bernstein, 2003), and for postpartum anxiety symptomatology between 13 and 40% (Glasheen, Richardson, & Fabio, 2010; Field, 2018). Symptoms of postpartum depression and anxiety tend to co-occur (Yelland et al., 2010); meta-analytic evidence demonstrated that the prevalence of combined anxiety and depression symptomatology is about 8.2% (Falah-Hassani, Shiri, & Dennis, 2016). For both depression and anxiety symptomatology, paternal prevalence rates are about 10% (Matthey, Barnett, Howie, & Kavanagh, 2003; Paulson, Dauber, & Leiferman, 2006; Rao et al., 2020).

While postpartum distress forms a threat to the parent's own health, parental symptomatology has also been associated with problems in the child's emotional, behavioural, and cognitive development (Goodman, Rouse, Connell, Robbins Broth, Hall, & Heyward, 2011; Field, 2018; Murray, Fearon, & Cooper, 2015; Glasheen et al., 2010; Rees, Channon, & Waters, 2018). For example, both maternal and paternal postpartum depression and anxiety have been related to children's internalizing and externalizing problems in early and middle childhood (Hentges, Graham, Fearon, Tough, & Madigan, 2020; Ahun et al., 2018; Sweeney & Macbeth, 2016). Furthermore, parental depression during childhood has been related to worse school performance (Shen et al., 2016) as well as symptoms of depression in early adolescence (Netsi, Pearson, Murray, Cooper, Craske, & Stein, 2018; Gutierrez-Galve et al., 2019). This suggests that parental distress following child birth not only affects the parents, but also the developing child.

While parental distress has been studied extensively among women at risk (such as women with a history of psychopathology or psychosocial problems), much less research has been focusing on women without specific risk factors for developing distress (i.e. universal populations of pregnant women). Also, the majority of research has been focusing on depression, leaving other forms of parental distress understudied (Evans et al., 2018; Sockol, 2018). Finally, as noted before, the lion's share of research has been dedicated to women, while an accumulating body of evidence showed that fathers do also experience a significant degree of distress (Hughes, Devine, Foley, Ribner, Mesman, & Blair; Matthey et al., 2003; Paulson et al., 2006). Therefore, in this thesis, we will focus on a variety of distress symptoms (including anxiety, depression, and general stress) among both parents, mothers as well as fathers, regardless of their pre-existing risk for developing psychopathology.

In the first chapter of this thesis, we will start off with examining a relatively understudied form of postpartum parental distress, namely maternal burnout symptomatology (Séjourné, Sanchez-Rodriguez, Leboullenger, & Callahan, 2018). Burnout consists of emotional exhaustion (lack of energy, low mood), depersonalization (detachment towards important others), and reduced personal

accomplishment (negative self-evaluation) (Maslach, Jackson, & Leiter, 1986). While originally associated with health care professionals, it has been increasingly recognized that burn-out could also play a role in other situations, such as non-professional contexts (Bianchi, Truchot, Laurent, Brisson, & Schonfeld, 2014). Recently, parental burnout has been defined as consisting of exhaustion with regard to the parental role, as well as emotional distance from one's children (Roskam, Brianda, & Mikolajczak, 2018). Preliminary research suggested that about 20% of mothers experiences symptoms of parental burnout (Séjourné et al., 2018). However, it is still unclear which factors are associated with the development of burnout symptomatology in mothers. Therefore, the aim of the first chapter was to identify potential predictors of maternal burnout[1], in particular their appraisal of the parenting role and their satisfaction with professional childcare arrangements.

Chapter 2 focuses on the association between maternal symptoms of anxiety and depression symptomatology when their children were between 0 and 12.5 years, and children's internalizing and externalizing difficulties at 12.5 years. In this chapter, we will distinguish between chronic (stable) and transient maternal symptomatology. While the association between maternal symptomatology postpartum and children's internalizing and externalizing difficulties has been well-established (Goodman et al., 2011; Murray et al., 2015; Field, 2018; Glasheen et al., 2010; Rees et al., 2018), it remains unclear how transient periods versus chronic maternal anxiety and depression symptomatology over longer periods of time affect child behavior. Through latent trait-state occasion modeling, it is possible to disentangle the differential associations between chronic (trait) versus transient (occasion) depression and anxiety symptomatology and children's emotional and behavioural development. This distinction is important because trait and occasion symptoms can relate differently to child outcomes (Kingston et al., 2018), and probably warrant different approaches with regard to intervention and prevention.

Interventions to prevent parental distress

Since parental distress symptomatology is associated with a range of child outcomes, preventing parental distress is important for both the parent's as well as the child's health and development. Moreover, if parental distress symptomatology and behavior impacts child development from birth onwards (Feldman, Eidelman, & Rotenberg, 2004; Hechler, Beijers, Riksen-Walraven, & De Weerth, 2019), it is important to intervene as early as possible, preferably before birth. Prenatal depression and

[1] In this thesis, maternal burnout will be referred to as 'burnout'.

anxiety symptomatology are common (Brown, Bossenbroek, Kluft, Van Tetering, & De Weerth, 2020; Field, 2017; Gavin, Gaynes, Lohr, Meltzer-Brody, Gartlehner, & Swinson, 2005; Pearson et al., 2018), also for fathers (Leach, Poyser, Cooklin, & Giallo, 2016; Paulson & Bazemore, 2010). Prevalence rates for depression and anxiety symptomatology during pregnancy are estimated to be about 15-18% for mothers (Gavin et al., 2005; Fairbrother, Janssen, Antony, Tucker, & Young, 2016); and between 4 and 16 % for fathers (Leach et al., 2016; Rao et al., 2020).

High levels of distress during pregnancy have been related to negative outcomes for the unborn child, such as a shorter gestational duration and lower birth weight (Dunkel Schetter & Tanner, 2012), and to problems in the child's socio-emotional, mental and motor development (Huizink, Robles de Medina, Mulder, Visser, & Buitelaar, 2003; Korja, Nolvi, Grant, & McMahon, 2017; Madigan et al., 2018; Nolvi et al., 2016). Moreover, maternal prenatal distress has been identified as a strong predictor of distress symptomatology postpartum (Field, 2011; Leigh & Milgrom, 2008; Huizink et al., 2017). Prenatal interventions with the aim of preventing postpartum distress thus seem warranted.

Until now, the focus in most prevention studies of postpartum distress has been on mothers who risk developing a disorder (selective prevention) or mothers who already display distress symptomatology, without meeting the criteria for a psychological disorder (indicated prevention). Known risk factors for the development of psychopathology after birth are: a history of psychopathology, pregnancy complications or an infant born prematurely, adverse life events, or low social support (e.g. Bayrampour et al. 2018; Dennis et al. 2017; Doyle et al. 2017; Wajid et al., 2020). Both indicated as well as selective prevention have been found to be effective in the prevention of depressive symptomatology during the transition to parenthood (Clatworthy, 2012; US Preventive Service Task Force, 2019; Sockol et al. 2013; Sockol 2015; Sockol, 2018). However, much is unknown about the effectiveness of universal prevention of symptoms of depression, anxiety and stress during pregnancy (Evans et al. 2018; Sockol, 2018). Universal prevention is aimed at all women regardless of their risk status or level of symptomatology. Also, little is known about the effectiveness of preventive interventions on other forms of distress beyond depression, such as anxiety and general stress (Evans et al., 2018; Sockol, 2018).

Next to the focus on indicated and selected prevention of depression symptomatology, existing interventions focus almost exclusively on the mother, instead of also including the partner. Indeed, a recent meta-analysis reported a paucity of research into interventions that aim to target depressive symptoms in men (Goldstein, Rosen, Howlett, Anderson, & Herman, 2020). However, the prevalence of distress in the postpartum period is also considerable among men (Hughes et al., 2020; Matthey et al., 2003; Paulson et al., 2006), and paternal distress has been associated with children's internalizing

and externalizing difficulties (Kvalevaag, Ramchandani, Hove, Assmus, Eberhard-Gran, Biringer, 2013; Sweeney & MacBeth, 2016). Furthermore, the inclusion of fathers in breastfeeding courses has been found to be beneficial for breastfeeding initiation and duration, as well as for the exclusivity of the breastfeeding (Abbass-Dick, Brown, Jackson, Rempel, & Lee-Dennis, 2019). The inclusion of fathers in preventive interventions seems thus to be important with regard to their own well-being, but also to enhance the quality of caregiving of both parents, and, ultimately, to boost the child's healthy development. In Chapter 3, we will review and meta-analyze the available evidence with regard to universally applicable interventions aimed at preventing maternal distress symptomatology postpartum, also including paternal and infant outcomes.

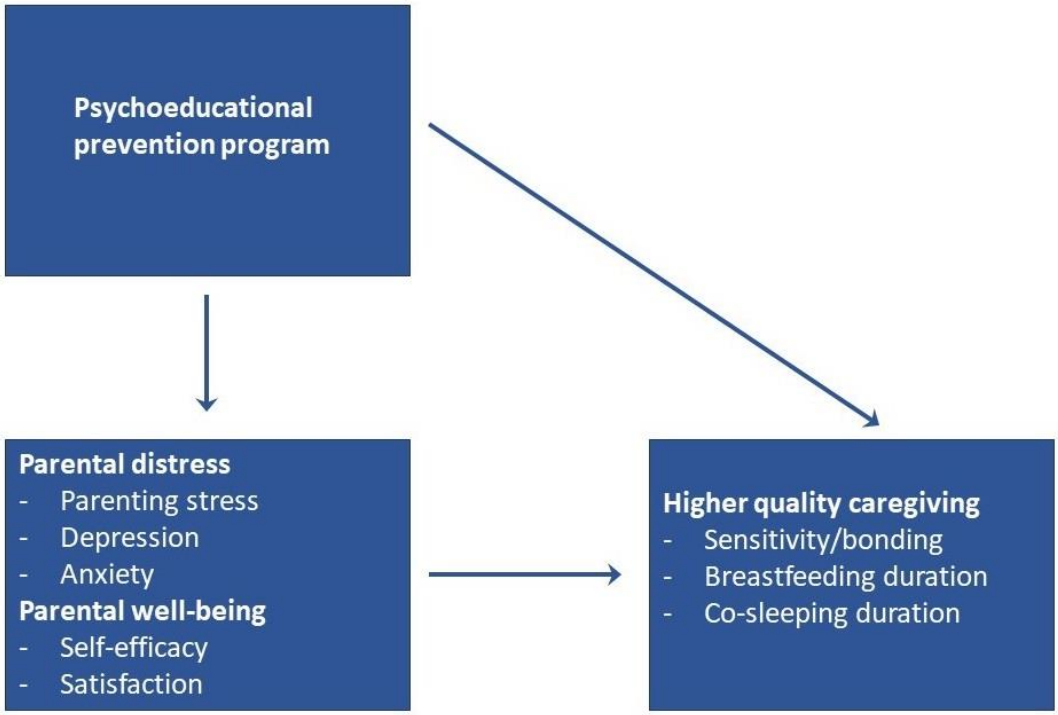
Importantly, parents report a clear need for reliable, non-judgmental, and evidence-based information about parenting a newborn (Henshaw et al. 2018; Young et al., 2020). Therefore, psychoeducational interventions, which are aimed at providing information, could be an easy to implement and low-cost option for universal prevention of distress among parents. Meta-analytic evidence showed that brief psychoeducational interventions can be effective in reducing symptoms of psychological distress (Donker, Griffiths, Cuijpers, & Christensen, 2009). However, as Henshaw et al. (2018) showed among a sample of parents varying in demographic characteristics, providing access to information does not necessarily reduce stress. The crucial element seems to be to arm parents with the ability to distillate reliable and evidence-based information from the information overload that is currently available (Young et al., 2020). Therefore, the aim of psychoeducation prevention programs should be to guide parents to up to date and scientifically validated information about the first months postpartum.

Possible underlying mechanisms relating parental distress to child development

The assumed underlying mechanism between postpartum parental distress and child development is that parental distress negatively affects the quality of parenting (Crnic et al. 2005; Koss & Gunnar, 2018; Stein et al., 2014). The parent-infant relationship and the quality of parenting are essential for children's emotional, behavioural, and social development (Osher et al., 2020). Therefore, quality of parenting might be a promising target of psychoeducational prevention programs. During the first months after birth, infants are completely dependent on their parents for stress regulation (Koss & Gunnar, 2018). Next to providing the infant with feeding, one of the most important aspects of high-

quality parenting is the ability to show warmth and sensitivity, and to be responsive to the child's needs (Stein et al., 2014). Beyond buffering parental distress and enhancing parental well-being, psychoeducation might therefore impact on caregiving quality by informing parents about: 1) sensitive responsiveness and bonding, 2) breastfeeding, and 3) room-sharing (Figure 1).

Figure 1. *Proposed targets of psychoeducational prevention programs: parental distress and caregiving quality*



Sensitive responsiveness, the ability to show warmth and sensitivity to the child's needs (Stein et al., 2014), is one of the most important aspects of high-quality parenting. It is one of the strongest predictors of the establishment of a secure attachment bond between infant and parent (De Wolff & Van IJzendoorn, 1997; Isabella & Von Eye, 1989). Securely attached children know that they can rely on their parents for safety and support (Ainsworth, Blehar, Waters, & Wall, 1987; Bowlby, 1969/1982). Furthermore, parental sensitivity is related to the development of the child's self-regulatory capacities (Bridgett, Burt, Edwards, & Deater-Deckard, 2015; Morawska, Dittman, & Rusby, 2019) and social competence (Sroufe, 2005). A sensitive and responsive parenting style is characterized by appropriate attunement to the child's needs, showing empathy, and being available for support, safety, and stress regulation (Osher et al., 2020; Stein et al., 2014). Parental distress can affect the ability of parents to

respond to and interact with their environment, and thus from focusing their attention on, and responding timely and sensitively to their infant's needs (Stein et al., 2014).

Breastfeeding is another aspect of early parental care that can be affected by distress. The World Health Organization recommends exclusive breastfeeding during the first six months after birth (WHO, 2017). The positive effects of breastfeeding for the child's health have been well-established, for example with regard to immune system functioning and cognitive development (Horta, Loret de Mola, & Victora, 2015; Victora et al., 2016). Maternal depressive symptomatology during pregnancy as well as during the postpartum period prenatal have been associated with a shorter duration of breastfeeding (Castro Dias & Figueiredo, 2015). Also for anxiety, mothers with higher prenatal levels were less likely to initiate breastfeeding and to continue breastfeeding beyond 6 months after birth (English, Wright, Ashburn, Ford, & Caramaschi, 2020). High levels of anxiety during the postpartum period have been negatively related to the initiation, duration, and exclusivity of the breastfeeding (Hoff, Movva, Vollmar, & Pérez-Escamilla, 2019). Thus, by psychoeducating parents about (breast)feeding arrangements and by preventing postpartum parental distress, breastfeeding rates might be increased.

Finally, room-sharing is another important aspect of parental care during the first months after birth. The American Academy of Pediatrics (AAP) recommends that children should sleep within the same room as the parents, on a separate surface, during the first six months after birth (Moon & the Task Force on Sudden Infant Death Syndrome, 2016). Parent–infant room sharing is advised because of the reduced rates of Sudden Infant Death Syndrome (SIDS e.g., Rollins, 2017; Tappin, Ecob, & Brooke, 2005). Next to reduction of SIDS, room-sharing is also supposed to result in other positive outcomes for the child. Room-sharing facilitates the process of breastfeeding (Ball, 2003; McKenna, Ball, & Gettler, 2007; Baddock, Purnell, Blair, Pease, Elder, & Galland, 2019), and the availability of the parents is suggested to help buffering the infant's distress, as parents can respond to the infant's signals of distress early on (Beijers, Riksen-Walraven, & De Weerth, 2013; Tollenaar, Beijers, Jansen, Riksen-Walraven & De Weerth, 2012). Moreover, longer duration of room-sharing during the first 6 months of the infant's life have been positively related to prosocial behaviour at 6 and 8 years after birth (Beijers, Cassidy, Lustermans, & De Weerth, 2019).

Aims and scope of our intervention

Given the importance of parental distress symptomatology and the quality of parenting (sensitive responsiveness, breastfeeding, and room-sharing) for child health and development (Goodman et al., 2011; Kvalevaag et al., 2013; Murray et al., 2015; Sweeney & MacBeth, 2016), there is a need for preventive interventions that are applicable to the general population of parents, mothers as well as fathers, regardless of pre-existing risk factors or symptomatology. Since parents reported a need for reliable, evidence-based and non-judgmental information about parenting a newborn (Henshaw et al., 2018), we aimed to provide them with up to date and scientifically validated information about the first months postpartum. The effectiveness of brief psychoeducational interventions aimed at providing information on psychological distress symptomatology has been established before (Donker et al., 2009). These interventions can be implemented easily, at relatively low cost. Therefore, they are very suitable for a universal preventive approach.

To be able to include a sample of parents varying in age, income, and educational level and to foster real-world implementation, we developed an easily accessible and low-intensity intervention that can be implemented during pregnancy and extends into the early postpartum period. This intervention consists of an information booklet, an educational video, a prenatal home visit during pregnancy and a supporting phone call during the first postpartum weeks. We will examine the effectiveness of this program to prevent postpartum symptoms of parenting distress in both mothers and fathers in a randomized controlled trial (Chapter 4). While research showed relatively high prevalence rates of both depression and anxiety (Field, 2018; Glasheen et al., 2010; Heron et al., 2004; McCoy et al., 2006; Morris-Rush et al., 2003; Yelland et al., 2010), previous preventive interventions mainly targeted depressive symptomatology. Therefore, the focus of our intervention is on depression, anxiety, as well as general stress symptomatology.

Aims and Research Questions

This dissertation is aimed at describing and preventing parental distress. First, we will examine a specific form of parental distress namely maternal burn-out (Chapter 2). We examined both facilitation and conflict between home and work among mothers with a child between 0 and 4 years of age. The next chapter describes the longitudinal course of parental distress (depression and anxiety) for the first

12,5 years after birth (Chapter 3). Importantly, we distinguished between chronic and transient maternal distress and examined how these were related to child development. The second part of the dissertation will focus on the prevention of parental distress. The effectiveness of preventive interventions aimed at pregnant women at high risk for developing parental distress, and for pregnant women who already experience distress symptomatology, has been already established. We systematically reviewed and meta-analyzed the available evidence on preventive interventions for *universal* samples of pregnant women (Chapter 4). Most of the included interventions in this meta-analysis were delivered face-to-face in group or individual settings. We developed a shorter and easily accessible psychoeducational prevention program, which is aimed at both mothers and fathers. We performed a randomized controlled trial to examine the effectiveness of this intervention. Chapter 5 describes the protocol of the study and in Chapter 6 the results of the trial are described. The thesis will conclude with a discussion in which the findings of the different chapters are integrated, and in which the strengths and weaknesses are described as well as recommendations for future research and for clinical practice (Chapter 7).

References

Abbass-Dick, J., Brown, H.K., Jackson, K.T., Rempel, L., & Dennis, C. (2019). Perinatal breastfeeding interventions including fathers/partners: A systematic review of the literature, *Midwifery*, *75*, 41-51. https://doi.org/10.1016/j.midw.2019.04.001

Abidin, R.R. (1992). The determinants of parenting behavior. *Journal of Clinical Child Psychology*, *21*, 407-412. https://doi.org/10.1207/s15374424jccp2104_12

Ahun, M., Consoli, A., Pingault, JB., Falissard, B., Battaglia, M., Boivin, M., Tremblay, R.E., & Côté, S.M. (2018). Maternal depression symptoms and internalising problems in the offspring: the role of maternal and family factors. *European Child & Adolescent Psychiatry*, *27*, 921–932. https://doi.org/10.1007/s00787-017-1096-6

Baddock, A., Purnell, M.T., Blair, P.S., Pease, A.S., Elder, D.E., & Galland, B.C. (2019). The influence of bed-sharing on infant physiology, breastfeeding, and behaviour: A systematic review. *Sleep Medicine Reviews*, *43*,106-117. https://doi.org/10.1016/j.smrv.2018.10.007

Ball, H.L. (2003). Breastfeeding, bed-sharing, and infant sleep. *Birth*, *30*, 181-188. https://doi.org/10.1046/j.1523-536X.2003.00243.x

Bayrampour, H., Vinturache, A., Hetherington, E., Lorenzetti, D.L., & Tough, S. (2018). Risk factors for antenatal anxiety: A systematic review of the literature. *Journal of Reproductive and Infant Psychology*, *36*, 476-503. https://doi.org/10.1080/02646838.2018.1492097

Beijers, R.J., Riksen-Walraven, M., & De Weerth, C. (2013). Cortisol regulation in 12-month-old human infants: associations with the infant's early history of breastfeeding and co-sleeping. *Stress*, *16*, 267-277. https://doi.org/10.3109/10253890.2012.742057

Beijers, R., Cassidy, J., Lustermans, H., & De Weerth, C. (2019). Parent-infant room-sharing during the first months of life: longitudinal links with behavior during childhood. *Child Development*, *90*, 1350-1368. https://doi.org/10.1111/cdev.13146

Bridgett, D. J., Burt, N. M., Edwards, E. S., & Deater-Deckard, K. (2015). Intergenerational transmission of self-regulation: A multidisciplinary review and integrative conceptual framework. *Psychological Bulletin, 141*, 602–654. https://doi.org/10.1037/a0038662

Browne, P.D., Bossenbroek, R., Kluft, A., Van Tetering, E.M.A., & De Weerth, C (2020). *Journal of Women's Health*. https://doi.org/10.1089/jwh.2019.8198

Castro Dias, C., & Figueiredo, B. (2014). Breastfeeding and depression: a systematic review of the literature. *Journal of Affective Disorders*, *171*, 142-154. https://doi.org/10.1016/j.jad.2014.09.022

Clatworthy, J. (2012). The effectiveness of antenatal interventions to prevent postnatal depression in high-risk women. *Journal of Affective Disorders*, *137*, 25-34. https://doi.org/10.1016/j.jad.2011.02.029

Crnic, K.A., Gaze, C., & Hoffman, C. (2005). Cumulative parenting stress across the preschool period: Relations to maternal parenting and child behaviour at age 5. *Infant and Child Development*, *14*, 117-132. https://doi.org/10.1002/icd.384

Dennis, C., Falah-Hassani, K., & Shiri, R. (2017). Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis. *The British Journal of Psychiatry*, *210*, 315-323. https://doi.org/10.1192/bjp.bp.116.187179

De Wolff, M.S., & Van IJzendoorn, M.H. (1997). Sensitivity and attachment: a meta-analysis on parental antecedents of infant attachment. *Child Development*, *68*, 571-591. https://doi.org/10.1111/j.1467-8624.1997.tb04218.x

Donker, T., Griffiths, K.M., Cuijpers, P., & Christensen, H. (2009). Psychoeducation for anxiety, depression, and psychological distress: a meta-analysis. *BMC Medicine*, *7*, 79. https://doi.org/10.1186/1741-7015-7-79

Doyle, O., Delaney, L., O'Farrelly, C., Fitzpatrick, N., Daly, M. (2017). Can early intervention improve maternal well-being? Evidence from a randomized controlled trial. *Plos One*, *12*. https://doi.org/10.1371/journal.pone.0169829

English, S., Wright, I., Ashburn, V., Ford, G., & Caramaschi, D. (2020) Prenatal anxiety, breastfeeding and child growth and puberty: linking evolutionary models with human cohort studies. *Annals of Human Biology*, *47*, 106-115. https://doi.org/10.1080/03014460.2020.1751286

Séjourné, N., Sanchez-Rodriguez, R., Leboullenger, A., & Callahan, S. (2018). Maternal burn-out: an exploratory study. *Journal of Reproductive and Infant Psychology*, *36*, 276-288. https://doi.org/10.1080/02646838.2018.1437896

Dunkel Schetter, C., & Tanner, L. (2012). Anxiety, depression and stress in pregnancy: implications for mothers, children, research, and practice. *Current opinion in psychiatry*, *25*, 141–148. https://doi.org/10.1097/YCO.0b013e3283503680

Emmanuel, E., & St. John, W. (2010). Maternal distress: a concept analysis. *Journal of Advanced Nursing*, *66*, 2104–2115. https://doi.org/10.1111/j.13652648.2010.05371.x

Evans, K., Morrell, C.J., Spiby, H. (2018). Systematic review and meta-analysis of non-pharmalogical interventions to reduce the symptoms of mild to moderate anxiety in pregnant women. *Journal of Advanced Nursing*, *74*, 289-309. https://doi.org/10.1111/jan.13456

Fairbrother, N., Janssen, P., Antony, M.M., Tucker, E., & Young, A.H. (2016). Perinatal anxiety disorder prevalence and incidence. Journal of Affective Disorders, 200, 148-155. https://doi.org/10.1016/j.jad.2015.12.082

Falah-Hassani, K., Shiri, R., & Dennis, C. (2016). Prevalence and risk factors for comorbid postpartum depressive symptomatology and anxiety, *Journal of Affective Disorders*, *198*, 142-147. https://doi.org/10.1016/j.jad.2016.03.010

Feldman, R., Eidelman, A.I. and Rotenberg, N. (2004). Parenting stress, infant emotion regulation, maternal sensitivity, and the cognitive development of triplets: A model for parent and child influences in a unique ecology. *Child Development*, *75*, 1774-1791. https://doi.org/10.1111/j.1467-8624.2004.00816.x

Field, T. (2017). Prenatal anxiety effects: A review. *Infant Behavior and Development*, *49*, 120-128, https://doi.org/10.1016/j.infbeh.2017.08.008.

Field, T. (2018). Postnatal anxiety prevalence, predictors, and effects on development: a narrative review. *Infant Behavior and Development*, *51*, 24-32. https://doi.org/10.1016/j.infbeh.2018.02.005

Fontein-Kuipers, Y.J., Nieuwenhuijze, M.J., Ausems, M., Budé, L., De Vries, R. (2014). Antenatal interventions to reduce maternal distress: A systematic review and meta-analysis of randomised trials. *BJOG*, *121*, 389-397.

Gavin, N., Gaynes, B., Lohr, K., Meltzer-Brody, S., Gartlehner, G., & Swinson, T. (2005). Perinatal Depression, Obstetrics & Gynecology, 106, 1071-1083 https://doi.org/10.1097/01.AOG.0000183597.31630.db

Glasheen C, Richardson GA, Fabio A. (2010). A systematic review of the effects of postnatal maternal anxiety on children. *Archives of Women's Mental Health*, *13*, 61-74. https://doi.org/10.1007/s00737-009-0109-y

Goldstein, Z., Rosen, B., Howlett, A., Anderson, M., & Herman, D. (2020). Interventions for paternal perinatal depression: A systematic review. *Journal of Affective Disorders*, *265*, 505-510. https://doi.org/10.1016/j.jad.2019.12.029

Goodman, S.H., Rouse, M.H., Connell, A.M., Robbins Broth, M., Hall, C.M., & Heyward, D. (2011). Maternal depression and child psychopathology: A meta-analytic review. *Clinical Child Family Psychology Review*, *14*, 1-27.

Gutierrez-Galve, L., Stein, A., Hanington, L., Heron, J., Lewis, G., O'Farrelly, C., & Ramchandani, P.G. (2019). Association of maternal and paternal depression in the postnatal period with offspring depression at age 18 years. *JAMA Psychiatry,* 76, 290–296. https://doi.org/10.1001/jamapsychiatry.2018.3667

Hechler, C., Beijers, R., Riksen-Walraven, M., & De Weerth, C. (2019). Prenatal predictors of postnatal quality of caregiving behavior in mothers and fathers. *Parenting*, *19*, 101-119, https://doi.org/10.1080/15295192.2019.1556010

Henshaw, E.J., Cooper, M.A., Jaramillo, M., Lamp, M.N., Jones, A.L., & Wood, T.L. (2018). "Trying to figure out if you are doing things right, and where to get the info": Parents recall information and support needed

during the first 6 weeks postpartum. *Maternal and Child Health Journal*, *22*, 1668-1675. https://doi.org/10.1007/s10995-018-2565-3

Heron, J., O'Connor, T.G., Evans, J., Golding, J., & Glover, V. (2004). The course of anxiety and depression through pregnancy and the postpartum in a community sample. *Journal of Affective Disorders*, *80*, 65-73. https://doi.org/10.1016/j.jad.2003.08.004

Hoff, C.E., Movva, N., Rosen Vollmar, A.K., Pérez-Escamilla, R. Impact of Maternal Anxiety on Breastfeeding Outcomes: A Systematic Review. (2019). *Advances in Nutrition,10,* 816–826. https://doi.org/10.1093/advances/nmy132

Hong Law, K., Dimmock, J., Guelfi, K.J., Nguyen, T., Gucciardi, D., Jackson, B. (2019). Stress, depressive symptoms, and maternal self-efficacy in first-time mothers: modelling and predicting change across the first six months of motherhood. *Applied Psychology: Health and Well-being*, *11*, 126-147. http://dx.doi.org/10.1111/aphw.12147

Horta, B.L., Loret de Mola, C., Victora, C.G. (2015). Breastfeeding and intelligence: a systematic review and meta-analysis. *Acta Paediatrica*, *104*, 14-19. https://doi.org/10.1111/apa.13139

Hughes, C., Devine, R.T., Foley, S., Ribner, A.D., Mesman, J., Blair, C. (2020). Couples becoming parents: Trajectories for psychological distress and buffering effects of social support. *Journal of Affective Disorders*, *265*, 372-380.

Huizink, A.C., Robles de Medina, P.G., Mulder, E.J., Visser, G.H. and Buitelaar, J.K. (2003). Stress during pregnancy is associated with developmental outcome in infancy. Journal of Child Psychology and Psychiatry, *44*, 810-818. https://doi.org/10.1111/1469-7610.00166

Huizink, A., Menting, B., De Moor, M., Verhage, M.L., Kunseler, F.C., Schuengel, C., & Oosterman, M. (2017). From prenatal anxiety to parenting stress: a longitudinal study. *Archives of Women's Mental Health*, *20*, 663–672. https://doi.org/10.1007/s00737-017-0746-5

Isabella, R.A., Belsky, J., & Von Eye, A. (1989). Origins of infant-mother attachment: an examination of interactional synchrony during the infant's first year. *Developmental Psychology*, *25*, 12-21. https://doi.org/10.1037/0012-1649.25.1.12

Kingston, D., Kehler, H., Austin, M. P., Mughal, M. K., Wajid, A., Vermeyden, L., Benzies, K., Brown, S., Stuart, S., & Giallo, R. (2018). Trajectories of maternal depressive symptoms during pregnancy and the first 12 months postpartum and child externalizing and internalizing behavior at three years. *PLoS ONE*, *13*, e0195365. https://doi.org/10.1371/journal.pone.0195365

Korja, R., Nolvi, S., Grant, K.A. & McMahon, C. (2017). The relations between maternal prenatal anxiety or stress and child's early negative reactivity or self-regulation: A systematic review. *Child Psychiatry & Hum Dev*elopment, *48***,** 851–869. https://doi.org/10.1007/s10578-017-0709-0

Koss, K.J., & Gunnar, M.R. (2018). Annual research review: Early adversity, the hypothalamic–pituitary–adrenocortical axis, and child psychopathology. *The Journal of Child Psychology and Psychiatry*, *59*, 327–346. http://dx.doi.org/10.1111/jcpp.12784

Kvalevaag A.L., Ramchandani, P.G., Hove, O., Assmus, J., Eberhard-Gran, M., Biringer, E. (2013). Paternal mental health and socioemotional and behavioural development in their children. *Pediatrics*, *131*, 1-7. https://doi.org/10.1542/peds.2012-0804

Leach, L.S., Poyser, C., Cooklin, A.R., & Giallo, R. (2016). Prevalence and course of anxiety disorders (and symptom levels) in men across the perinatal period: A systematic review. *Journal of Affective Disorders*, *190*, 675-686. https://doi.org/10.1016/j.jad.2015.09.063.

Leigh, B., & Milgrom, J. (2008). Risk factors for antenatal depression, postnatal depression, and parenting stress. *BMC Psychiatry*, *8*, 24. https://doi.org/10.1186/1471-244X-8-24

Madigan, S., Oatley, H., Racine, N., Pasco Fearon, R.M., Schumacher, L., Akbari, E., Cooke, J.E., & Tarabulsy, G.M. A meta-analysis of maternal prenatal depression and anxiety on child socioemotional development, *Journal of the American Academy of Child & Adolescent Psychiatry*, *57*, 645-657.e8. https://doi.org/10.1016/j.jaac.2018.06.012

Matthey, S., Barnett, B., Howie, P., & Kavanagh, D.J. (2003). Diagnosing postpartum depression in mothers and fathers: whatever happened to anxiety? *Journal of Affective Disorders*, *74*, 139-47. https://doi.org/10.1016/S0165-0327(02)00012-5

McCoy, S.J., Beal, J.M., Shipman, S.B., Payton, M.E., & Watson, G.H. (2006). Risk factors for postpartum depression: A retrospective investigation at 4-weeks postnatal and a review of the literature. *Journal of the American Osteopathic Association*, *106*, 193-198.

McKenna, J.J., Ball, H.L., & Gettler, L.T. (2007). Mother-infant co-sleeping, breastfeeding, and sudden infant death syndrome: What biological anthropology has discovered about normal infant sleep and pediatric sleep medicine. *American Journal of Physical Anthropology*, *134*, 133-161. https://doi.org/10.1002/ajpa.20736

Moon R., & Task Force on Sudden Infant Death Syndrome. (2016). SIDS and other sleep-related infant deaths: evidence base for updated recommendations for a safe infant sleeping environment. *Pediatrics*, *138*, e20162940. https://doi.org/10.1542/peds.2016-2940.

Morawska, A., Dittman, C.K. & Rusby, J.C. (2019). Promoting self-regulation in young children: the role of parenting interventions. *Clinical Child and Fam Psychology Review, 22***,** 43–51 (2019). https://doi.org/10.1007/s10567-019-00281-5

Morris-Rush, J.K., Freda, M., Bernstein, P.S., 2003. Screening for postpartum depression in an inner-city population. *American Journal of Obstetrics and Gynecology*, *188*, 1217-1219. https://doi.org/10.1067/mob.2003.279

Nolvi, S., Karlsson, L., Bridgett, D.J., Korja, R., Huizink, A.C., Kataja, E., & Karlsson, H. (2016). Maternal prenatal stress and infant emotional reactivity six months postpartum. *Journal of Affective Disorders*, *199*, 163-170. https://doi.org/10.1016/j.jad.2016.04.020

Osher, D., Cantor, P., Berg, J., Steyer, L., Rose, T. (2020). Drivers of human development: How relationships and context shape learning and development. *Applied Developmental Science*, *24*, 6-36. https://doi.org/10.1080/10888691.2017.1398650

Paulson, J.F., Dauber, S., Leiferman, J.A. (2006). Individual and combined effects of postpartum depression in mothers and fathers on parenting behavior. *Pediatrics*, *118*, 659-668. https://doi.org/10.1542/peds.2005-2948

Rao, W., Zhu, X., Zong, Q., Zhang, Q., Hall, B.J., Ungvari, G.S., & Xiang, Y. (2020). Prevalence of prenatal and postpartum depression in fathers: A comprehensive meta-analysis of observational surveys. *Journal of Affective Disorders*, *263*, 491-499. https://doi.org/10.1016/j.jad.2019.10.030

Rollins, J. (2017). Sharing a room: updated recommendations for a safe infant sleeping environment. *Pediatric Nursing*, *43*, 7.

Séjourné, N., Sanchez-Rodriguez, R., Leboullenger, A., & Callahan, S. (2018). Maternal burn-out: an exploratory study, *Journal of Reproductive and Infant Psychology*, *36*, 276-288. https://doi.org/10.1080/02646838.2018.1437896

Shen, H., Magnusson, C., Rai, D., Lundberg, M., Lê-Scherban, F., Dalman, C., Lee, B.K. (2016). Associations of parental depression with child school performance at age 16 years in Sweden. *JAMA Psychiatry, 73*, 239–246. https://doi.org/10.1001/jamapsychiatry.2015.2917

Sockol, L.E., Epperson, C.N., Barber, J.P. (2013). Preventing postpartum depression: a meta-analytic review. *Clinical Psychology Review*, *33*, 1205-1217. https://doi.org/10.1016/j.cpr.2013.10.004

Sockol, L.E. (2015). A systematic review of the efficacy of cognitive behavioral therapy for treating and preventing perinatal depression. *Journal of Affective Disorders*, *177*, 7-21. https://doi.org/10.1016/j.jad.2015.01.052

Sockol, L.E. (2018). A systematic review and meta-analysis of interpersonal psychotherapy for perinatal women. *Journal of Affective Disorders*, *232*, 316-328. https://doi.org/10.1016/j.jad.2018.01.018

Sroufe, A.L. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. 2005: *Attachment & Human Development*, *7*, 349-367.

Stein, A., Pearson, R.M., Goodman, S.H., Rapa, E., Rahman, A., McCallum, M., Howard, L.M., & Pariante, C.M. (2014). Effects of perinatal mental disorders on the fetus and child. *The Lancet*, *384*, 1800-1819. https://doi.org/10.1016/S0140-6736(14)61277-0

Tappin, D., Ecob, R., & Brooke, H. (2005). Bedsharing, roomsharing, and sudden infant death syndrome in Scotland: A case-control study. *The Journal of Pediatrics*, *147*, 32-37. https://doi.org/10.1016/j.jpeds.2005.01.035

Tollenaar, M.S., Beijers, R., Jansen, J., Riksen-Walraven, M., & De Weerth, C. (2012). Solitary sleeping in young infants is associated with heightened cortisol reactivity to a bathing session but not to a vaccination. *Psychoneuroendocrinology*, *37*, 167-177. https://doi.org/10.1016/j.psyneuen.2011.03.017

US Preventive Services Task Force. Interventions to prevent perinatal depression: US Preventive Task Force recommendation statement. (2019). *JAMA*, *321*, 580-587. https://doi.org/10.1001/jama.2019.0007

Victora, C.G., Bahl, R., Barros, A.J.D., França, G.V.A., Horton, S., Krasevec, J., Murch, S., Jeeva Sankar, M., Walker, N., Rollins, N.C. (2016). Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *The Lancet*, *387*, 475-490. https://doi.org/10.1016/S0140-6736(15)01024-7

Wajid, A., Kingston, D., Bright, K.S., Mughal, M.K., Charrois, E.M., & Giallo, R. (2020). Psychosocial factors associated with trajectories of maternal psychological distress over a 10-year period from the first year

postpartum: An Australian population-based study. *Journal of Affective Disorders*, *263*, 31-38. https://doi.org/10.1016/j.jad.2019.11.138

Yelland, J., Sutherland, G., Brown, S.J. (2010). Postpartum anxiety, depression and social health: findings from a population-based survey of Australian women. *BMC Public Health*, *10*, 771. https://doi.org/10.1186/1471-2458-10-771

Young C, Roberts R, Ward L. (2020). Hindering resilience in the transition to parenthood: a thematic analysis of parents' perspectives. *Journal of Reproductive and Infant Psychology.* https://doi.org/10.1080/02646838.2020.1757630

2

The work-home interface: the role of home-based predictors of burnout among mothers

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2014. *Family Science*, *4*, 148-160.
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Abstract

Research into the work-home interface has mainly focused on work-related variables, leaving aspects associated with the home domain relatively understudied. This investigation examined both facilitation and conflict between home and work in a sample of 260 working mothers with children up to four years of age. Potential home domain predictors of burnout were examined, using structural equation modeling. A neglected home-related variable is satisfaction with substitute childcare. Thus, a new scale was developed to measure satisfaction with infant day care centers. Results show a substantial influence of home-based variables, thus supporting the need for inclusion of such variables. Parenting appraisals are related to home-work conflict and facilitation, and ultimately show the expected associations with burnout. Satisfaction with infant day care influences burnout through parenting stress and satisfaction with the parental role. These results are discussed in the light of existing literature and implications for practice are considered.

Keywords: Work-home interface, mothers, burnout, structural equation modeling

In a large European survey of work and family life, it was reported that Dutch mothers, like their counterparts in the Benelux and France, resume working when their children are much younger than in other European countries (European Quality of Life Survey, 2010). This is because formal childcare is available in the Benelux for children from the age of 2 months onwards and it is culturally accepted to make use of the availability of childcare for these very young children (European Quality of Life Survey, 2010). This is in sharp contrast with the Nordic countries, where it is formally arranged that children can spend the first year of their lives at home; mothers in these countries can make use of parental leave arrangements for the duration of one year. Moreover, compared to other European countries, a record rate of 75% of Dutch women works part-time (European Quality of Life Survey, 2010). Since Dutch mothers make use of childcare for their very young children, it is interesting to consider whether this unique context could add to a broader understanding of issues relating to combining multiple roles. This context forms a useful starting point for examining the work-home interface, including the exploration of maternal concerns about their dual roles, which is the focus of the current study.

The development of burnout is related to the experience of work stress, having been referred to as a "specific type of job stress that is characterized by its chronic and multifaceted nature" (Schaufeli & Buunk, 2003, p. 389). Prolonged work stress can thus be understood as a risk factor for the development of burnout. Since working mothers mention numerous pressures (Van Dijke, Terpstra, & Hermans, 1994), there is a need to investigate predictors of burnout specifically for this group. Women's (work) stress could heighten their burnout risk, and could explain part of their reluctance to engage in (fulltime) jobs after giving birth.

The present study has two main interests. First, although most work-home studies have focused on the direction of interference from work to home when predicting burnout (e.g. Kinnunen, Feldt, Geurts, & Pulkinnen, 2006; Montgomery, Peeters, Schaufeli, & Panagopoulou, 2008) one might expect the opposite direction of interference, namely from home to work. Home variables could also influence burnout development. In our opinion, experiences at home might be carried over to the office, influencing the development of burnout risk there. One relatively neglected home-based predictor has been added, namely, satisfaction with center-based childcare. Second, while most studies focused on conflict between work and home (Eby, Casper, Lockwood, Bordeaux, & Brinley, 2005), this study explicitly pays attention to the possibility of facilitation between the two domains. Moreover, facilitation is expanded to parenting appraisals, in that not only parenting stress, but also parenting satisfaction is measured as a predictor of interaction between home and work. Thus, given

the emphasis in past research on work-related variables and interference from work to home, the aim of the current study is to examine variables reflecting the home side of the work-home interface.

Next, before we turn to the literature review, the main terms and concepts in work-home research are defined. Then, theories and empirical evidence leading to the choice of variables are discussed. Finally, the hypotheses are described

The work-home interface

Geurts and Demerouti (2003) defined the work-home interface as a "process whereby one's functioning in one domain is influenced by quantitative and qualitative demands and resources from the other domain (p.288)." Four types of work-home interaction have been distinguished, namely, conflict from work to home and from home to work, and facilitation from work to home and from home to work (Frone, 2003; Grzywacz & Marks, 2000)[1].

Regarding the conflict aspect, this has been defined as "A type of role conflict that arises when joint role pressures from work and family domains are experienced as incompatible in some respect, as a result of which participation in one role is made more difficult by virtue of participation in the other role" (Greenhaus & Powell, 2003 p. 291).Different dimensions of conflict have been identified in the literature (Greenhaus & Beutell, 1985). In this study, the focus is on time-based and strain-based conflict. *Time-based conflict* refers to the notion that time devoted to certain in-role behavior could never be spent on activities necessary for another role (cf. Marks, 1977), while *strain-based conflict* comes into play when stress and strain experienced in a focal role have a negative

[1] Chang, McDonald and Burton (2010) argued that more consistency in the conceptualization of work-home constructs is needed. Indeed, Kinnunen et al., (2006) studied *work-family spillover*, Greenhaus and Powell (2006) *work-family enrichment* and Van Steenbergen, Ellemers, and Mooijaart (2007) used the term *work-family facilitation*. However, most work family researchers now agree that these terms point to different constructs and are related to different linking mechanisms (for more details see Carlson et al., 2006; Van Steenbergen et al., 2007). A related line of research has focused on the integration of both domains (e.g. Baylin & Harrington, 2004). Because this study builds on the work of Van Steenbergen et al. (2007), the constructs of *home-work facilitation and conflict* are used here.

influence on performance in a second role (Greenhaus & Beutell, 1985).

The second aspect, namely facilitation, has been defined as the phenomenon that participation in one role makes it easier to fulfil the requirements of another role (Van Steenbergen et al., 2007). In this way, participation in one role could have positive effects on another role (Marks, 1977). Broaden-and-build theory (Frederickson, 2000) has been proposed as the main theoretical rationale behind work-home facilitation (e.g. Van Steenbergen et al., 2007). The theory postulates that positive emotions can have long lasting positive effects. It is argued that positive emotions broaden people's capacity to experience a wide range of thoughts and actions, which build personal resources.

Just as there are specific dimensions of conflict, so have different forms of facilitation been identified in the literature (Van Steenbergen et al., 2007). This study focused on *time-based facilitation,* which takes place when time spent on one role enhances planning and usage of time in another role; and *energy-based facilitation* which is defined as "occurring when energy obtained in one role makes it easier to fulfil the requirements of another role" (Van Steenbergen et al., 2007, p.281).

As the following overview of studies will show, the possible enhancing effects of home-based variables (in particular parenting appraisals and childcare satisfaction) on home-work facilitation have received little or no empirical investigation so far.

Review of home-work literature encompassing home-based predictors

Table 1 summarizes relevant studies assessing the influence of home-based factors on home-work interference. Looking at the specific home-based variables studied in previous research, it becomes apparent that most studies focused on variables such as family support (e.g. Aryee, Fields, & Luk 1999), home demands (e.g. Demerouti, Bakker, & Voydanoff, 2010) and family distress (e.g. Grandey & Cropanzona, 1999). To our knowledge, no study has as yet assessed child-specific variables, such as the child's wellbeing, and childcare arrangements. Of course, this is partly attributable to the fact that there are few studies exclusively focusing on parents. Thus, since childcare arrangements have largely been neglected in home-work research, the current study introduces the variable satisfaction

with center-based daycare. Also, to underline the focus on parents, parenting appraisals (both positive and negative) are included.

Some limitations in the available literature on the work-home interface also become apparent. Most notably, only four studies took facilitating experiences into account (Aryee, Srinivas, & Tan, 2005; Demerouti et al., 2010; Kinnunen et al., 2006; Voydanoff, 2005). Furthermore, apart from Dilworth (2004) and Voydanoff (2005), no study explicitly assessed positive experiences related to parenting. Also, most studies focused on samples composed of both parents and nonparents. Finally, only one study assessed the influence of home-based variables on burnout (Montgomery et al., 2008).

In the next sections, we review the relevant home-based variables, starting with daycare satisfaction, concluding with a brief overview of studies that link the work-home interface to burnout.

Table 1. *Empirical Studies Relating Home-Based Variables to Home-Work Conflict and Facilitation and Work-Related Outcomes*

Authors / Country	Home-based variables	Sample Characteristics	Results
Adams, G.A., King, L.A., & King, D.W. (1996) United States	Family social support (instrumental and emotional), family involvement, family interfering with work (FIW)	163 participants, aged 21-62 years 64% women	Family involvement and family social support (emotional) positively related to FIW. Family social support (instrumental) negatively related to FIW. Family involvement positively related to family social support (emotional).
Aryee, S., Fields, D., & Luk , V. (1999) Hong Kong	Family-work conflict (FWC), family involvement, family conflict, family satisfaction	320 participants, 85% aged between 30 and 49 years 28% women; 79% parents	Family conflict positively related to FWC. Family involvement unrelated to FWC.
Aryee, S., Srinias, E.S., & Tan, H.H. (2005) India	Parental overload, family involvement, family support, work-family balance (all directions)	267 parents (no further information available)	Family support positively related to FWF. Family involvement negatively related to FWF.
Demerouti, E., Bakker, A.B. & Voydanoff , P. (2010) The Netherlands	Home demands, home resources, home-work interference, home-work facilitation	190 male employees and their spouses and co-workers, mean age 43 years (men) and 40 years (women) 68% parents	Home demands and resources of the men were related to self-reported HWI and HWF.

Dilworth, J.E. (2004) United States	Household chores, time spent caring for children, marriage and family life satisfaction, negative family-work spillover	453 working parents 56% women	More working mothers than fathers experienced negative family-to-work spillover. Taking care for a sick child was a predictor for working fathers, number of hours worked per week for mothers. Among the strongest predictors for both groups was family life satisfaction.
Frone, M.R., Russel, M. & Cooper, M.L. (1992) United States	Family involvement, family stressors, family distress, family-work conflict (FWC)	631 participants, mean age 40.7 years 56% women 78% had children living at home	Family involvement positively related to FWC and negatively related to family distress. Family stressors positively related to FWC and family distress. FWC positively related to work distress.
Frone, M.R., Yardley, J.K. & Markel, K.S. (1997). United States	Family-related antecedent variables (spousal and family social support), family overload, family time commitments, family distress, family performance, family-work conflict (FWC)	372 participants, mean age 35.77 years 75% women 77% parents	Family overload, family distress and family time commitments positively related to FWC. Spousal social support negatively related to family time commitments and family distress. Family social support negatively related to family overload and family distress. Family distress negatively related to family performance. FWC negatively related to work performance.
Grandey, A.A. & Cropanzano, R. (1999) United States	Family role stress, family distress and family-work conflict (FWC)	132 participants, majority between 31-60 years old. 43% women 50% parents 148 participants in second wave	Number of children positively related to family role stress and FWC. Family role stress positively related to FWC.

Hill, E.J. (2005) United States	Work-family conflict and facilitation (both directions), family satisfaction, marital satisfaction	1314 parents 48% women	FWC negatively related to family and marital satisfaction. FWF positively related to family and marital satisfaction.
Kinnunen, U., Feldt, T., Geurts, S. & Pulkinnen, L. (2006) Finland	Negative family-work spillover, positive family-work spillover, marital satisfaction	202 employees, all 42 years old 52% women 93% parents	Negative family-work spillover related to marital dissatisfaction. Positive family-work spillover not related to any of the well-being indicators.
Montgomery, A.J., Peeters, M.C.W., Schaufeli, W.B. & Panagopoulou, E.P. (2008). The Netherlands	Home-work interference (HWI), negative affectivity (at home), marital satisfaction	78 couples (male-female), mean age 47 years 62% parents	Work-home interference associated with work-related outcomes like burnout and health complaints. No relationship between HWI and burnout.
Voydanoff, P. (2005) United States	Family demands, community demands, family resources, community resources, family-work conflict (FWC), family-work facilitation (FWF)	1567 parents, mean age 46 years 40% women	FWC higher among women and parents of children younger than 6 years. Family demands positively related to FWC. Spouse and household demands negatively related to FWF. Social incoherence and friend demands positively related to FWC. Family resources positively related to FWF.

Satisfaction with the infant day care center[2]

Satisfaction with the infant day care center addresses feelings and opinions parents hold about these centers. Studies that assess *parent-rated* quality of infant day care centers are scarce (Buffardi & Erdvins, 1997). As a result, there are few instruments measuring parental satisfaction with day care centers. Probably the most comprehensive scale used in work-home research is developed by Buffardi and Erdvins (1997). Their scale is useful in various child care settings. Also, to our knowledge, only one study in the work-home literature has related (parent-rated) satisfaction with childcare arrangements to conflict between work and family life, concluding that satisfaction is negatively related to work-home conflict (Goff, Mount & Jamison, 1990).

In this study, two forms of satisfaction have been developed, namely situational and emotional satisfaction. It is argued that *Emotional satisfaction* refers to the feelings parents hold about bringing their child to the day care center (e.g. feelings of guilt), while *Situational satisfaction* concerns the more objective subjects, like feeding, sleeping and hygiene. In our opinion it is important to make this distinction, because parents could be satisfied with situational aspects, and at the same time be dissatisfied with the more emotional aspects of using professional childcare. For example, a mother may feel guilty for bringing her child to the day care center and may thus experience emotional dissatisfaction, while she is simultaneously satisfied with, for example, the hygiene standards. None of the existing scales distinguishes among these proposed components, therefore, in this study, a new scale to measure parent-rated day care satisfaction has been developed.

[2] Because the vast majority of Dutch parents choose formal day care centers for their children, the current study focuses exclusively on this form of day care. It is important to note that the Dutch formal child care situation may be different from other countries. It is generally quite positively endorsed. For example, in 2009, 40% of Dutch households with children younger than four years, mentioned formal child care as the most important form of child day care (Statistics Netherlands, 2011). It is used with reasonable frequency. Roughly a quarter of all Dutch children between 0 and 4 years old attend a day care center (Vermeer et al., 2008). There is financial support: Dutch parents receive a government contribution for the costs of childcare. There is some quality control: All childcare centers are regularly checked by the national public health center.

Parenting Appraisals

Turning to parenting appraisals, two forms can be distinguished: parenting stress and satisfaction with the parenting role. Parenting stress is a specific form of stress experienced by the parent as a result of perceived demands associated with the parenting role (Östberg & Hagekull, 2000). Thus, as Abidin (1992) stated, parenting stress results from various appraisals of these parental demands made by the individual parent. This is consistent with Greenhaus and Beutell's (1985) notion that certain aspects of a specific role could bring about strain and therefore problems of meeting the demands of another role. Indeed, Grandey and Cropanzano (1999) found a positive relationship between family role stress and family-work conflict, and Frone, Yardley and Markel (1997) similarly showed that family distress was positively associated with family-work conflict.

Consistent with the beneficial role of positive emotions stated in broaden-and-build theory, satisfaction with the parenting role is included in the model as well. There is some research on satisfaction with family life. For example, Dilworth (2004) concluded that family life satisfaction is negatively related to negative spillover from family to work. Furthermore, in a study with a very substantial sample size, Voydanoff (2005) showed that family resources (spousal support, household rewards, parenting support and kin support) were relatively strongly related to family-work facilitation. Also, Demerouti et al. (2010) concluded that for men, home resources had a direct positive effect on job performance, beyond an indirect effect through home-work conflict. However, Demerouti, Geurts and Kompier (2004) found no association between support from home and home-work facilitation and home-work conflict.

Burnout

Burnout was mentioned at the outset as a major problem relating to work stress. It has therefore been selected as the outcome variable in the current study. Burnout is commonly conceptualized as consisting of three dimensions, namely exhaustion, cynicism and professional efficacy (Schaufeli, Leiter, Maslach, & Jackson, 1996; in Mostert, Peeters & Rost, 2011). Exhaustion is defined as extreme fatigue and stress resulting from depletion of both emotional and physical resources. Cynicism means indifference and negativity towards the job and can arise when one is unable to fulfil work duties. Finally, professional efficacy reflects performance at work. Most studies did not include the professional efficacy scale, because the first two scales are thought of as the core burnout

dimensions (Montgomery et al., 2008; Mostert et al., 2011). The current study followed this line of work.

Burnout research in the work-home literature has mainly taken factors in the work sphere into account. As such, it is by now well-established that burnout dimensions are strongly predicted by conflict between work and family (Allen, Herst, Bruck & Sutton, 2000; Kinnunen et al., 2006; Montgomery et al., 2008; Peeters, Wattez, Demerouti, & Regt, 2009). However, only one study has assessed the relationship between home-work interference and burnout: Montgomery et al. (2008) found no association. However, Frone et al. (1997) showed that work distress and work overload were outcomes of family to work conflict, indicating that home-work conflict leads to negative work outcomes.

Research examining the effects of home-work facilitation and work-home facilitation on burnout is virtually nonexistent. Nevertheless, Van Steenbergen et al. (2007) showed that when facilitation measures are added to conflict measures, the explained variance in stress outcomes (e.g., emotional exhaustion) was significantly larger.

Inclusion of home-based variables

In summary, taking into account the above limitations has the potential to shed new light on work-home research, to guide our own research and expand the scope of empirical investigation within the work-home sphere. Thus, in this study, building on broaden-and build theory and empirical evidence, a structural model of the home-work interface has been developed and empirically tested, allowing us to jointly examine home-work conflict and facilitation. In this way, we aim to add to the existing models reviewed in Table 1 and to offer new starting points for work family research.

Figure 1. *Research Model*

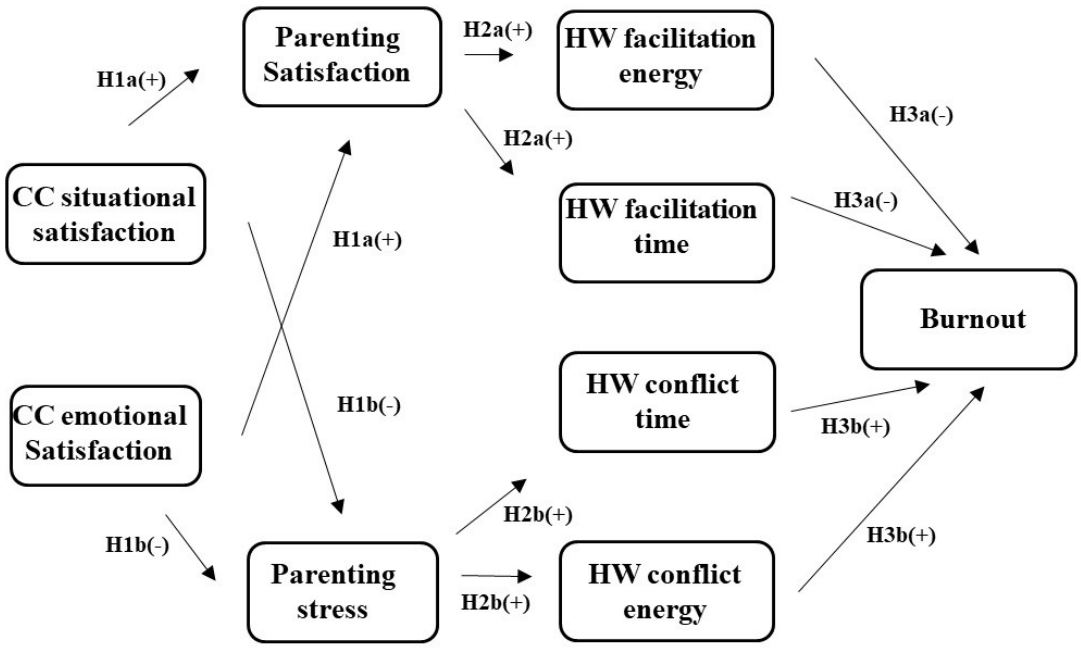


Figure 1 shows the hypothesized model. We propose two hypotheses on satisfaction with infant day care centers as predictors of parenting appraisals. Dissatisfaction with the infant day care center may well be a source of parenting stress. Two lines of reasoning seem plausible. First if a mother sees that her child receives less than the best day care she considers desirable, the dissatisfaction with this situation may serve as a catalyst for parenting stress. Second, emotional dissatisfaction brings about feelings of guilt irrespective of how the child objectively fares at the center. Sociological research has shown gendered preferences for childcare (Craig & Mullan, 2011), resulting in mothers providing the lion's share of child caring. A mother may feel dissatisfied with 'having to' call upon a child care center to fulfil part of the caretaking she would rather supply herself. Emotional dissatisfaction with the infant day care center could then translate into parenting stress. We argue that satisfaction with the center has the reverse effect. A mother may be satisfied with the facilities offered at the center and see that her child is happy there. Also, the mother may feel that attending the infant day care center contributes to the development of the child. Either

way, through situational or emotional components, satisfaction with the infant day care center may well translate into satisfaction with the parenting role. This gives:

Hypothesis 1A: Satisfaction with the infant day care center is positively related to satisfaction with the parenting role.

Hypothesis 1B: Satisfaction with the infant day care center is negatively related to parenting stress.

Furthermore, following the reviewed beneficial role of home resources and the established detrimental effects of home strain, it is argued that parenting appraisals may be transferred to the work domain:

Hypothesis 2A: Satisfaction with the parenting role is positively related to facilitation between home and work (both time and energy).

Hypothesis 2B: Parenting stress is positively related to conflict between home and work (both time and strain).

Concerning the hypothesized association between home-work interaction and burnout, it is important to specify the direction of the relationship, as most research in this area does not adopt a longitudinal approach (Chang et al., 2010). An association between work-home conflict and burnout may, for example, be interpreted as burnout symptoms being carried over from work to the home domain. Implications (e.g., for practice; counselling) are then difficult to derive, since the root of the problem may lie at work – causing burnout – or at home. We are not able to adopt a longitudinal approach either, but we detail the proposed underlying mechanisms. We suggest that home-based experiences, outlined above, are carried over to work and result in burnout risks there. Home-work conflict, instead of work-home conflict, that is the key construct of interest. Thus, following previous research on work-home conflict and work-home facilitation, we hypothesize:

Hypothesis 3A: Home-work conflict (both time and strain) is positively related to burnout symptoms.

Hypothesis 3B: Home-work facilitation (both time and energy) is negatively related to burnout symptoms.

Method

Sample and procedure

Participants were recruited in two different ways. First, infant day care centers were contacted. In total, 15 managers of Dutch infant day care centers received a written or e-mail request to participate in the research project, a concept letter designed for parents, and an informed consent form. Day care centers were selected on the basis of their proximity to the university. Two weeks later, all centers received a reminder by phone to check if they had received the package and to ask if there were any questions. Another three weeks later, the managers were contacted again, and received a new package with letters and informed consent forms, on request. By the end of this procedure, four childcare centers in urban areas had agreed to participate in the study.

Second, advertisements were placed on websites designed for parents with young children. Advertisements were placed on the websites of the Dutch association for parents who make use of various types of childcare; in a magazine designed for parents about professional childcare; and on the forum of a Dutch website for parents. The study was conducted in accordance with the ethical principles of Utrecht University.

An online questionnaire was used. Participants could access it by clicking on a link (advertisements on websites) or typing a provided link in their browser (in letters distributed at day care centers). The survey started with an informed consent form. Participants were twice given the opportunity to comment on the questionnaire: first, after the day care questions – relating particularly to day care issues left untouched in the survey – and at the end of the questionnaire, where parents were invited to add any comments they might have had in relationship to the questionnaire. Following the informed consent form, the questionnaire continued with demographics.

The questionnaire was filled in by 312 mothers and 30 fathers. Since only a small number of men responded, for this particular analysis, we decided to focus on the women only. To ensure as much coherence in the sample as possible, data from mothers who did not make use of formal childcare arrangements (25), unemployed mothers (17), and single mothers (11) were excluded from the current analyses. Also, based on the conclusion of Direnzo, Greenhaus and Weer (2011) that experiences of work home interference differ between higher and lower level workers, mothers with

an educational level less than intermediate vocational education (*MBO,* 2 cases) were excluded. The final sample consisted of 260 women. The respondents' age ranged from 23 to 48 years, with a mean age of 34 years and a standard deviation of 4 years; 15 percent of the sample had completed intermediate vocational education; 40 percent higher vocational education and 45 percent had completed a university degree. Women worked on average 25-28 hours per week, while for partners this number was 33-36 hours.

Measures

Satisfaction with the Infant Day Care Center. 14 items were developed to measure this construct (Appendix 1) on the basis of earlier research (Goff et al., 1990; Buffardi & Erdvins, 1997) and experiences reported by parents in a pilot project. In this pilot project, parents had been asked explicitly if they thought some aspect of satisfaction with childcare was missing. None mentioned any additional aspects, suggesting that our scale was reasonably comprehensive. As described above, the construct was divided into two subscales; *Situational Satisfaction* (9 items) and *Emotional Satisfaction* (5 items). Each item could be rated on a 5-point scale (ranging from 'Totally disagree' to 'Totally agree'). At the end of this scale, there was some space for further comments regarding childcare. Participants again did not mention any missing aspects (Cronbach's alpha's for all measures are given in the results section.)

*Parenting Stress***.** The scale consists of 11 items, 10 were derived from the Dutch 'Nijmeegse Parenting Stress Index' (NOSI; de Brock, Vermulst & Gerris, 1992). The NOSI is the Dutch translation of the Parenting Stress Index (PSI; Loyd & Abidin, 1985). The PSI is especially relevant to parents with children up to three years of age. One item was added because it was considered to be central to the parenting stress construct (at least for parents with very young children): 'The responsibility I have for my children weighs on me'. Response options varied on a 6-point scale from 'Totally disagree' to 'Totally agree'.

Satisfaction with the Parenting Role. This scale consists of seven items, three derived from the NOSI (de Brock et al., 1992); four items were added that represent, in our view, an essential part of the satisfaction with the parenting role construct: (1) 'I enjoy spending time with my children'; (2) 'Being a parent gives me a sense of pride'; (3) 'The birth of my children has enriched my life'; and (4) 'Deep down, I know I am a good parent'. Participants could indicate how much they agreed with each item on a 6-point scale.

Home-Work Conflict was measured using the subscales time-based and strain-based conflict developed by Carlson, Kacmar and Williams (2000), each consisting of three items. We used the translated and slightly adapted version of Van Steenbergen et al. (2007), in which home (and home life) is used instead of the narrower formulation of family (and family life). Carlson et al. (2000) note good psychometric properties. Items could be rated on a 5-point scale (ranging from 'Completely disagree' to 'Completely agree') An example item is: 'Because of stress at home, I am often distracted by home issues at work'.

Home-Work Facilitation was measured by the time-based and energy based subscales developed by Van Steenbergen et al. (2007). Both scales consist of three items. Van Steenbergen et al. (2007) report good reliabilities. Items could again be rated on a 5-point scale (ranging from 'Completely disagree' to 'Completely agree'), an example item is: 'Because I am able to relax and regain strengths at home, I can better concentrate on my work'.

*Burnout***.** The subscales 'Exhaustion' (five items) and 'Cynicism' (four items) of the Utrecht Burnout Scale (UBOS-A; Schaufeli & Van Dierendonck, 2000) were used to measure burnout. The UBOS has shown excellent psychometric properties (Schaufeli & Van Dierendonck, 2000). Items could be rated on a 7-point scale, with response options varying form 'Strongly disagree' to 'Strongly agree'. An example item is: 'At the end of a workday, I feel empty.'

Data analysis

Statistical analyses were performed using SPSS 15.0 and Lisrel 8.80 (Jöreskog & Sörbom, 2007). The structural equation modeling (SEM) analysis performed by Lisrel is a statistical technique, which combines factor analysis and multiple regression analysis. With SEM, the structure of interrelationships in series of equations can be observed (Hair, Black, Babin, Anderson & Tatham, 2006). Constructs are thought of as latent variables, and their corresponding items are indicators, also referred to as observed variables, of these latent variables. In this study, the two-step estimation method described by Anderson and Gerbing (1988) and Hair et al. (2006) was used. According to this method, the measurement model is estimated first, and the quality of the measurement is then assessed. Once a satisfactory measurement model has been achieved, the structural constraints (i.e., the hypotheses) are imposed on the model, allowing for an interpretation of the structural parameters (i.e., the coefficients). In this way, interpretational confounding is precluded, because the interpretation of results is separated from the development of a theoretically sound measurement

model (Anderson & Gerbing, 1988). Raw data was used as input and maximum likelihood estimates were obtained.

Results

Measurement model

First, several confirmatory factor analyses were performed to establish the validity of the constructs. In other words, the hypothesized relationships between the indicators (scale items) and their underlying latent factors (the scales) were tested. Items with a factor loading of less than .5 – in absolute terms – were deleted from further analyses, while ensuring that each scale consisted of a minimum of three items for identification purposes (Hair et al., 2006). Table 2 shows the final solution. The measurement model provides a good approximation of the data ($\chi^2_{(df=1312,\ N=260),}$ = 2484.82, p<.01; CFI= .92; SRMR= 0.09; RMSEA = .06) and shows satisfying levels of model fit, construct reliability and convergent and discriminant validity. Criteria for good fit are a nonsignificant chi-square, a CFI >.92, a SRMR <.09 and a RMSEA< .08. Notably, when the model gets more extensive, the chi-square value increases automatically (Hair et al., 2006). The chi-square sometimes lowers the fit of a model for reasons not directly related to the overall validity of the model. Given the relative complexity of the current model, this may well be the case. Using SPSS, a reliability analysis was performed. Results show acceptable reliability coefficients for all variables, especially for the work-home conflict (energy-based) construct and burnout. Notably, both childcare scales show good psychometric properties on all indices. Reliabilities are somewhat lower for parenting stress and work-home conflict/facilitation (time-based). However, they still meet or exceed the lower limit of acceptability (α > .60 -.70).

Convergent validity was assessed by means of Cronbach's alpha, the factor loadings of the indicators on the latent constructs, and the variance extracted estimates (VEE). The VEE's are the averaged squared factor loadings (Hair et al., 2006). As can be seen, almost all loadings exceed the lower limit of acceptability (λ > .50). A considerable number of items exceed the ideal limit of .70. Examination of the VEE's shows that a considerable number of constructs meet the norm (>.50), indicating that the amount of variance in the measures explained by the latent constructs is substantial. A possible explanation for some constructs not reaching the norm of .50 could be that

the VEE is a very stringent measure, not frequently reported in empirical research. When the mean factor loading is equal to the minimum criterion of .50, the resulting VEE is only .25. Moreover, the VEE lowers fast when the average factor loading decreases slightly.

Table 2. *Validity of Latent Constructs*

	Items in scale	Items in analysis	Factor loadings $\lambda < 0.50$	Mean λ	VEE	Cronbach's α
Childcare situational	9	8	0	.70	.50	.87
Childcare emotional	5	3	0	.71	.51	.74
Parenting stress	11	5	1	.60	.37	.68
Parenting satisfaction	7	5	0	.63	.41	.77
HW facilitation energy	3	3	1	.74	.59	.77
HW facilitation time	3	3	0	.61	.38	.64
HW conflict energy	3	3	0	.86	.75	.90
HW conflict time	3	3	0	.61	.37	.64
Burnout	9	9	0	.73	.54	.91

Notes: Items in scale refers to the number of items in the questionnaire. Items in analysis is the number of items in the final CFA. Factor loadings λ < .50 is the number of items with factor loadings lower than .50. Items with factor loadings less than .50 were deleted from the final CFA.VEE is the variance extracted estimate. HW refers to home-work facilitation or conflict.

Table 3. *Correlations between latent variables*

		Mean	St.dev.	1	2	3	4	5	6	7	8
1	Childcare situational	4.26	.53	1.00							
2	Childcare emotional	3.79	.88	.34**	1.00						
3	Parenting stress	2.95	1.01	-.22**	-.27**	1.00					
4	Parenting satisfaction	5.51	.47	.37**	.22**	-.57**	1.00				
5	HW facilitation energy	3.54	.70	.17*	.15	-.40**	.34**	1.00			
6	HW facilitation time	3.58	.75	.19*	.31**	-.15	.19*	.39**	1.00		
7	HW conflict energy	2.07	.97	-.26**	-.30**	.58**	-.35**	-.32**	-.25**	1.00	
8	HW conflict time	2.71	.82	-.13	-.27**	.52**	-.34**	-.23**	.04	.61**	1.00
9	Burnout	2.46	1.02	-.16*	-.37**	.57**	-.26**	-.23**	-.49**	.52**	.41**

*Notes: Means are the composite mean with all factor loadings set to 1.00. St.dev. is the standard deviation of the composite mean. HW refers to work-home facilitation or conflict. * p < .05. ** p < .01.*

Finally, discriminant validity was evaluated by comparing the VEEs of two pairs of latent constructs to their squared correlation (Hair et al., 2006). The variance extracted estimates should be lower than their squared correlation, because a latent construct is assumed to explain its own items better than those of another latent construct. For all pairs of constructs, discriminant validity was established. In conclusion, the measurement model shows adequate fit and reliability and validity according to most indices. The variance-extracted estimates somewhat discredit this conclusion, probably due to its strictness. Table 3 shows the descriptive statistics for all latent measures, including correlations between variables.

Structural Model

After specifying the measurement model, the parameters of the structural model were estimated, as the second step in the two-step method. The structural model (Figure 2) shows good fit to the data ($\chi^2_{(df=806,\ N=260)} = 1626.86$, $p<.01$; CFI = .93; SRMR = .09; RMSEA = .06). The explained variance in burnout is as substantial as 49 percent; the explained variance in home-work conflict is also substantial, particularly when compared to the R^2 for home-work facilitation.

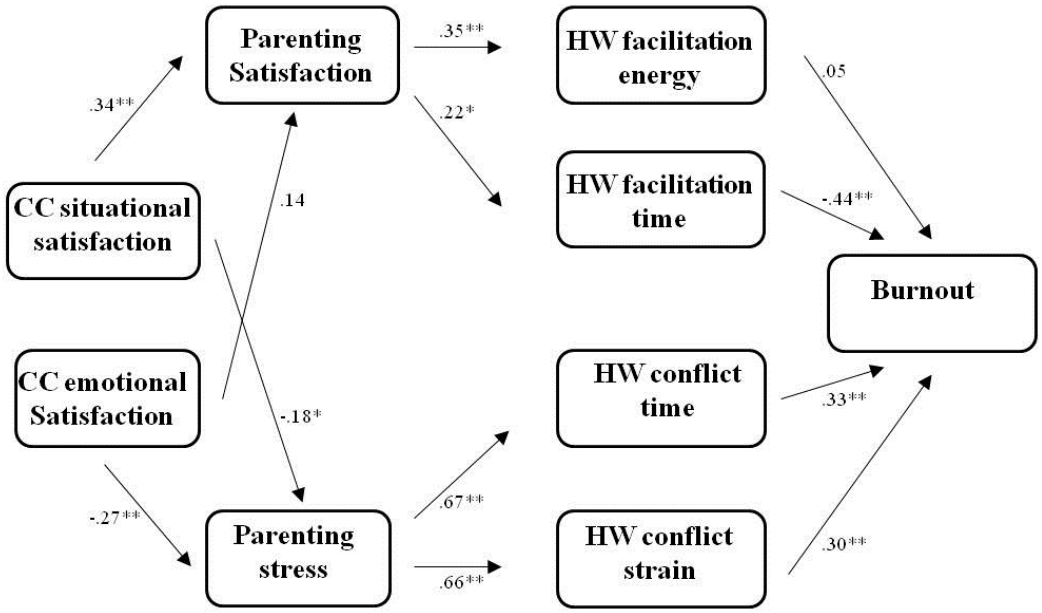
Regarding the specific hypotheses, in line with our expectations, more emotional satisfaction with the infant day care center is related to less parenting stress (β= -.27, $p<.01$), but unrelated to satisfaction with the parenting role. This supports our Hypothesis 1B but does not lend support to Hypothesis 1A, as we had expected that more emotional satisfaction would be related to both parenting variables. However, mothers who are more satisfied with the situational aspects of the center, report less parenting stress (β= -.18, $p<.05$) and significantly more satisfaction with the parenting role (β= .34, $p<.01$). Thus, Hypothesis 1B is fully supported, and we find evidence partially in line with Hypothesis 1A.

Furthermore, mothers who are more satisfied with the parenting role, report higher levels of both energy-based (β=.35, $p<.01$) and time-based HWF (β=.22, $p<.05$). Moreover, as hypothesized, higher levels of parenting stress are related to more HWC for both the time (β=.67, $p<.01$) and the energy component (β=.66, $p<.01$). Thus, the findings lend support to Hypotheses 2A and 2B.

In line with Hypothesis 3A, higher levels of work-home facilitation (time-based) are firmly related to lower levels of burnout (β= -.44, $p<.01$). Contrary to expectations, the energy dimension of home work facilitation seems unrelated to burnout (β=.05, $p>.05$). Therefore, Hypothesis 3A

receives partial support. Higher levels of conflict are associated with higher levels of burnout for both the time (β=.33, *p*<.01) and the energy (β=.30, *p*<.01) component, lending support to Hypothesis 3B.

Figure 2. *Parameter estimates for the research model*



*Notes: parameter estimates are next to the arrows, * p < .05. ** p < .01.*

Finally, total effects of the unique childcare variables (i.e., situational and emotional satisfaction), on burnout were computed. Results show that both variables have an equally strong, negative effect on burnout (β= -.102 and β= -.124 respectively), indicating that - via the various mediating paths allowed for in the model - both situational and emotional satisfaction are strongly related to burnout; the effect of emotional satisfaction being slightly larger than that of situational satisfaction. Since prior work focused on situational satisfaction only, this further justifies the inclusion of emotional satisfaction with childcare arrangements in studies of the work-home interface. Also, the tests of total effects confirm that the negative pathway from childcare satisfaction through parenting stress and home work conflict to burnout shows the strongest effects, when compared to the pathway through satisfaction with the parenting role and work- home facilitation. This again indicates the importance of including the childcare satisfaction variables.

Post-hoc analyses

Since two dimensions of the burnout construct were measured, post-hoc, a model with burnout separated into Exhaustion and Cynicism was tested. Results showed the same pattern of relationships as described above. The hypotheses are similarly supported (or not), and the results are thus robust against separating burnout in its component variables.

Discussion

The aim of the current study was to develop and empirically examine home-based predictors of the home work interface, thereby assessing the influence of relatively understudied home-based variables (Eby et al., 2005) on interaction between home and work and ultimately the development of burnout in a sample of mothers with children younger than four years.

These results are, in our view, unique in that they demonstrate that home-based variables have a powerful influence on burnout, through facilitation and conflict between home and work. Both are directly related to burnout, although conflict appears to be more important. Furthermore, the newly-developed satisfaction with formal childcare measure proves to be both reliable and valid (although further validation would be recommendable), and results suggest that satisfaction with formal childcare influences work-home conflict and facilitation through parenting appraisals.

This investigation contributed to the existing literature in several ways. First, an analysis of the understudied home side of the work home interface was proposed and empirically investigated, focusing on home-work facilitation and conflict, and burnout. Second, a new measure of satisfaction with childcare facilities was developed, allowing us to study this variable in relation to home-work conflict and facilitation. To our knowledge, no study today examined the influence of this variable on both aspects of home-work interaction. Third, as most studies focused on conflict between work and home (or vice versa) (Geurts & Demerouti, 2003; Voydanoff, 2005), this study explicitly assessed the influence of facilitation experiences on burnout.

In the following sections, these results are systematically discussed, starting at the left side of the model (Figure 2). Next, limitations of this study and possibilities for future research are considered. Finally, implications for theory and practice are considered.

Starting with the discussion of the results, this study showed that mothers who are satisfied with their infant day care center, seem to be protected from parenting stress and the detrimental pathway to burnout that follows from it. There is also a positive pathway from situational satisfaction which boosts satisfaction with the parenting role and gives rise to facilitation experiences between home and work. Of course, as holds for the whole analysis, conclusions about causality could not be drawn. Another possibility would therefore be that less stressed mothers are more satisfied with formal childcare arrangements, and that mothers who experience more satisfaction with their parenting role, are also more satisfied with the infant day care center. However, since situational aspects of the day care center are not likely to be influenced by appraisals of the parent, the former alternative seems currently the more plausible, at least for the situational component.

Future research may unravel whether the current results extend to other forms of infant day care, for example informal infant day care. Moreover, the results imply that the quality of infant day care centers may not only be important for the health and development of young children, but also for the well-being of their parents, both at work and at home. It is intriguing that satisfying situation-based conditions at the day care center seem to enhance parenting satisfaction, while the more emotional aspects do not yield such an effect. One explanation could be that there may well be other aspects of emotional satisfaction with childcare centers not covered by our scale. Also, it may be that emotional dissatisfaction has a stronger detrimental effect on parenting appraisals than the opposite situation. More research is needed to test these options.

Strong significant relationships were found between parenting stress and the home-work conflict dimensions of time and strain, which extends previous research pointing to the detrimental effects of family stress (Frone et al., 1997), parenting overload, family demands (Byron, 2005) and home demands (Demerouti et al., 2010) on work-home conflict. Also, for women who expressed more satisfaction with their role as a mother, facilitation experiences between home and work intensified. This corresponds with the finding that family resources have a firm association with family-to-work facilitation (Voydanoff, 2005).

Finally, both facilitation and conflict between home and work influenced burnout in a powerful way. This is consistent with Langballe, Innstrand, Aasland and Falkum (2011), who reported a positive

association between home-work conflict and disengagement from work and the finding that work distress and work overload are outcomes of family to work conflict (Frone et al., 1997). Furthermore, mothers who experienced more time-based facilitation between home and work were less susceptible to burnout. This confirms results of the pioneering study of Van Steenbergen et al. (2007).

Remarkably, the energy-based component of home-work facilitation did not influence burnout. Apparently, for mothers, mainly time-factors like more effective planning seem to protect from burnout symptoms, instead of energy-related factors (like energy-building during time spent at home). Future research is necessary to explore these unexpected findings and examine the reasons why these relationships were not found.

As holds for all studies, this research is not without limitations. First, as mentioned, conclusions are based on cross-sectional data. This means that it is not possible to draw causal inferences, even though the findings correspond with relevant prior research. Second, the fact that only working mothers with young children were studied, means inevitably that it is impossible to generalize results to working fathers or to parents with older children. Future research could usefully investigate questions regarding gender differences in parenting appraisals, satisfaction with infant day care, and their subsequent associations with burnout. Extension to parents with school-age children is especially important because these parents make use of different childcare services, and are likely to be confronted with other struggles and facilitation experiences. Research into satisfaction with childcare arrangements outside school hours is needed to gain further insights into the role of home-based variables in the development of and protection from burnout. Third, because the majority of participating mothers worked part time, results are not directly generalizable to fulltime working mothers. Still, since Dutch mothers largely prefer small, part-time jobs in combining work and family life (Schippers, 2011), results are highly relevant to the vast majority of Dutch working mothers. Finally, both the number and emotional character of reactions of the mothers on the open-ended questions (both after the childcare items and at the end of the questionnaire) suggest that combining home and work is, at least for mothers with young children, a topic that appeals to many different feelings and experiences. Adding qualitative research (e.g. in-depth interviews) would shed more light on their experiences and is likely to generate a wealth of interesting information.

Finally, this study has theoretical and practical implications. Theoretically, different pathways to burnout are shown, each starting in the home domain. The strongest pathway leads from parenting stress through work-home conflict (both time-based and energy-based). The childcare variables influence burnout through their significant effects on parenting stress and satisfaction with the parenting role.

If confirmed, these results may have important practical implications. For example, it could help to reduce burnout among working mothers (and possibly fathers), if employers were aware of the influence of the home situation (including appraisal of childcare facilities). These influences could be both negative as well as positive. Also, this study showed the possible facilitating effects the home situation could have on factors at work, at least for working mothers. Attention to the home situation, by introducing family-friendly workplace practices such as flexible work schedules or in-company childcare is thus likely to be rewarding for employers, because burnout is costly for them. Moreover, for policymakers, the message is that high-quality infant day care could ultimately have important protecting effects on burnout symptoms for working mothers, which is of economic as well as societal relevance. In conclusion, in our view, this study shows that more attention to the home situation is warranted when studying mothers combining multiple roles and when developing policies to support mothers in combining their multiple roles. This seems even more relevant in a context with such a high proportion of working mothers and the availability of childcare for very young children.

References

Abidin, R.R. (1992). The determinants of parenting behavior. *Journal of Clinical Child Psychology*, *21*, 407-412. https://doi.org/10.1207/s15374424jccp2104_12

Adams, G.A., King, L.A., & King, D.W. (1996). Relationships of job and family involvement, family social support, and work-family conflict with job and life satisfaction. *Journal of Applied Psychology*, *81*, 411-420. https://doi.org/10.1037/0021-9010.81.4.411

Allen, T.D., Herst, D.E., Bruck, C.S.,& Sutton, M. (2000). Consequences associated with work-to-family conflict: a review and agenda for future research. *Journal of Occupational Health Psychology*, *21*, 271-282. https://doi.org/10.1037/1076-8998.5.2.278

Allen, T.D., Johnson, R.C., Saboe, K.N., Cho, E., Dumani, S., & Evans, S. (2012). Dispositional variables and work-

family conflict: A meta-analysis. *Journal of Vocational Behavior*, *80*, 17-26. https://doi.org/10.1016/j.jvb.2011.04.004

Anderson, J.C., & Gerbing, D.W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103*, 411-423.

Aryee, S., Srinivas, E.S., & Tan, H.H. (2005). Rhytms of life: Antecedents and outcomes of work-family balance in employed parents. *Journal of Applied Psychology*, *90*, 132-146. https://doi.org/10.1037/0021-9010.90.1.132

Aryee, S., Fields, D., & Luk, V. (1999). A cross-cultural test of a model of the work-family interface. *Journal of Management*, *25*, 491-511. https://doi.org/10.1177/014920639902500402

Buffardi, L.C., & Erdvins, C.J. (1997). Child-care satisfaction: linkages to work attitudes, interrole conflict and maternal separation anxiety. *Journal of Occupational Health Psychology*, *2*, 84-96. https://doi.org/10.1037/1076-8998.2.1.84

Byron, K. (2005). A meta-analytical review of work-family conflict and its antecedents. *Journal of Vocational Behavior*, *67*, 169-198. https://doi.org/10.1016/j.jvb.2004.08.009

Carlson, D.S., Kacmar, K.M., & Williams, L.J. (2000). Construct and initial validation of a multidimensional measure of work-family conflict. *Journal of Vocational Behavior*, *56*, 249-276. https://doi.org/10.1006/jvbe.1999.1713

Carlson, D.S., Kacmar, K.M., Wayne, J.H., & Grzywacz, J.G. (2006). Measuring the positive side of the work-family interface: Development and validation of a work-family enrichment scale. *Journal of Vocational Behavior*, *68*, 131-164. https://doi.org/10.1016/j.jvb.2005.02.002

Chang, A., McDonald, P., and Burton, P. (2010). Methodological choices in work-life balance research 1987 to 2006: A critical review. *International Journal of Human Resource Management*, *21*, 2381-2413. https://doi.org/10.1080/09585192.2010.516592

Craig, L., & Mullan, K. (2011). How mothers and fathers share childcare: a cross-national time-use comparison. *American Sociological Review*, *76*, 834-861. https://doi.org/10.1177/0003122411427673

Davidson, M.J., & Cooper, C.L., & Baldini, V. (1995). Occupational stress in female and male graduate managers: A comparative study. *Stress and Health*, *11*, 157-175. https://doi.org/10.1002/smi.2460110126

De Brock, A.J.L.L., Vermulst, A.A., & Gerris, J.R.A. (1992). *Nijmeegse ouderlijke stress index: meetinstrument voor de vaststelling van stress bij opvoeders*. Lisse: Swets & Zeitlinger.

Demerouti, E., & Geurts, S.A. (2004). Towards a typology of work-home interaction. Community, *Work and Family*, *7*, 285-309. https://doi.org/10.1080/1366880042000295727

Demerouti, E., Geurts, S.A., & Kompier, M. (2004). Positive and negative work-home interaction: Prevalence and correlates. *Equal Opportunities International*, *23*, 6-35. https://doi.org/10.1108/02610150410787837

Demerouti, E., Bakker, A.B., & Voydanoff, P. (2010). Does home life interfere with or facilitate job performance? *European Journal of Work and Organziational Psychology, 19*, 128-149.

https://doi.org/10.1080/13594320902930939

Dilworth, J.E. (2004). Predictors of negative spillover from family to work. *Journal of Family Issues*, *25*, 241-261. https://doi.org/10.1177/0192513X03257406

Direnzo, M.S., Greenhaus, J.H., & Weer, C.H. (2011). Job level, demands, and resources as antecedents of work-family conflict. *Journal of Vocational Behavior*, *78*, 305-314. https://doi.org/10.1016/j.jvb.2010.10.002

Eby, L.T., Casper, W.J., Lockwood, A.,Bordeaux, C., & Brinley, A. (2005). Work and family research in IO/OB: Content analysis and review of the literature (1980-2002). *Journal of Vocational Behavior*, *66*, 124-197. https://doi.org/10.1016/j.jvb.2003.11.003

European Foundation for the Improvement of Living and Working Conditions (2010). European Quality of Life Survey (2010). Retrieved from http://www.eurofound.europa.eu/pubdocs/2010/02/en/1/EF1002EN.pdf on September 26, 2013.

Frederickson, B.L. (2000). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist*, *56*, 218-226. https://doi.org/10.1037/0003-066X.56.3.218

Frone, M.R., Russel, M., Cooper, M.L. (1992a). Antecedents and outcomes of work-family conflict: Testing a model of the work-family interface. *Journal of Applied Psychology*, *77*, 65-78. https://doi.org/10.1037/0021-9010.77.1.65

Frone, M.R., Yardley, J.K., & Markel, K.S. (1997). Developing and testing an model of the work-family interface. *Journal of Vocational Behavior*, *50*, 145-167.

Frone, M. R. (2003). Work-family balance. In J. C. Quick & L. E. Tetrick (Eds.), *Handbook of occupational health psychology*. Washington, DC: American Psychological Association.

Grandey, A.A., & Cropanzano, R. (1999). The conservation of resources model applied to work-family conflict and strain. *Journal of Vocational Behavior*, *54*, 350-370.

Geurts, A.E., & Demerouti, E. (2003). Work/non-work interface: A review of theories and findings. In Marc J. Schabracq, Jacques A.M. Winnubst & Cary L. Cooper (Eds.), *The handbook of work & health psychology* (pp.279-312). Hoboken: John Wiley & Sons Inc.

Goff, S.J., Mount, M.K., & Jamison, R.L. (1990). Employer supported child care, work/family conflict, and absenteeism: A field study. *Personnel Psychology*, *43*, 793-809. https://doi.org/10.1111/j.1744-6570.1990.tb00683.x

Greenhaus, J.H. & Beutell, N.J. (1985). Sources of conflict between work and family roles. *Academy of Management Review*, *10*, 76-88. https://doi.org/10.5465/amr.1985.4277352

Greenhaus, J.H. & Powell, G.N. (2003). When work and family collide: Deciding between competing role demands. *Organizational Behavior and Human Decision Processes*, *90*, 291-303. https://doi.org/10.1016/S0749-5978(02)00519-8

Greenhaus, J. H., & Powell, G. N. (2006). When work and family are allies: A theory of work–family enrichment. *Academy of Management Review*, *31*, 72-92. https://doi.org/10.5465/amr.2006.19379625

Grzywacz, J.G., & Marks, N.F. (2000) Reconceptualizing the work-family interface: an ecological perspective on the correlates of positive and negative spillover between work and family. *Journal of Occupational Health Psychology*, *5*, 11-126. https://doi.org/10.1037/1076-8998.5.1.111

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., Tatham, R.L. (2006). *Multivariate data analysis.* New Jersey: Pearson Prentice Hall.

Hill, E.J. (2005). Work-family facilitation and conflict, working fathers and mothers, work-family stressors and support. *Journal of Family Issues*, *26*, 793-819. https://doi.org/10.1177/0192513X05277542

Jöreskog,K. & Sörbom, D. (2007). *Lisrel 8.80: All new version.* Lincolnwood, IL: Scientific Software International, Inc.

Kinnunen, U., Feldt, T., Geurts, S., & Pulkkinen, L. (2006). Types of work-family interface: Well-being correlates of negative and positive spillover between work and family. *Scandinavian Journal of Psychology*, *47*, 149-162. https://doi.org/10.1111/j.1467-9450.2006.00502.x

Langballe, E.M., Innstrand, S.T., Aasland, O.G., & Falkum, E. (2011). The predictive value of individual factors, work-related factors, and work-home interaction on burnout in female and male physicians: A longitudinal study. *Stress and Health*, *27*, 73-87. https://doi.org/10.1002/smi.1321

Loyd, B.H. & Abidin, R.R. (1985). Revision of the Parenting Stress Index. *Journal of Pediatric Psychology*, *10*, 169-177. https://doi.org/10.1093/jpepsy/10.2.169

Marks, S.R. (1977). Multiple roles and role strain: some notes on human energy, time and commitment. *American Sociological Review*, *42*, 921-936. https://doi.org/10.2307/2094577

Montgomery, A.J., Peeters, M.C.W., Schaufeli, W.B. & Panagopoulou, E.P. (2008). Cross-over and work-home interference. *The Irish Journal of Psychology*, *29*, 61-76. https://doi.org/10.1080/03033910.2008.10446274

Mostert, K., Peeters, M., & Rost, I. (2011). Work-home interference and the relationship with job characteristics and well-being: A South African study among employees in the construction industry. *Stress and Health*, *27*, 238-251. https://doi.org/10.1002/smi.1374

Östberg, M.,& Hagekull, B. (2000). A structural modeling approach to the understanding of parenting stress. *Journal of Clinical Child Psychology*, *29*, 615-625. https://doi.org/10.1207/S15374424JCCP2904_13

Peeters, M., Wattez, C., Demerouti, E., & De Regt, W. (2009). Work-family culture, work-family interference and well-being at work. Is it possible to distinguish between a positive and a negative process? *Career Development International*, *14*, 700-713. https://doi.org/10.1108/13620430911005726

Schaufeli, W.B., & Van Dierendonck, D. (2000). Utrechtse Burnout Schaal: Handleiding. Lisse: Swets & Zeitlinger.

Schaufeli, W.B., & Buunk, B.P. (2003). Burnout: An overview of 25 years of research and theorizing. In Marc J. Schabracq, Jacques A.M. Winnubst & Cary L. Cooper (Eds.), *The handbook of work & health psychology* (pp.383-428). Hoboken: John Wiley & Sons Inc.

Schippers, J. (2011). The economic rationality of late parenthood. In: G. Beets, J. Schippers, & E.R. te Velde (Eds.). *The Future of Motherhood in Western Societies: Late Fertility and Its Consequences* (pp. 91-106). Springer: Dordrecht (etc.).

Statistics Netherlands (2011). Werkende moeders. Retrieved January, 24, 2011 from http://www.cbs.nl/nl-NL/menu/themas/arbeid-sociale-zekerheid/cijfers/extra/werkende-moeders.htm.

Statistics Netherlands (2011). Kinderopvang voor werkende ouders belangrijker geworden. Retrieved December 14, 2011 from http://www.cbs.nl/nl-nl/menu/themas/arbeid-sociale-zekerheid/publicaties/artikelen/archief/2010/2010-3216-wm.htm

Van Dijke, A., Terpstra, L., & Hermanns, J. (1994). Ouders over kinderopvang. Een onderzoek naar meningen, ervaringen, wensen en keuzen van mannen en vrouwen. Amsterdam: Stichting Centrum voor Onderwijsonderzoek.

Van Steenbergen, E.F., Ellemers, N., & Mooijaart, A. (2007). How work and family can facilitate each other: distinct types of work-family facilitation and outcomes for women and men. *Journal of Occupational Health Psychology*, *12*, 279-300. https://doi.org/10.1037/1076-8998.12.3.279

Vermeer, H.J., IJzendoorn, M.H., De Kruif, R.E.L., Fukkink, R.G., Tavecchio, L.W.C., Riksen-Walraven, J.M., & Van Zeijl, J. (2008). Child care in The Netherlands: Trends in quality over the years 1995-2005. *The Journal of Genetic Psychology*, *169*, 360-385. https://doi.org/10.3200/GNTP.169.4.360-385

Voydanoff, P. (2005). The differential salience of family and community demands and resources for family-to-work conflict and facilitation. *Journal of Family and Economic Issues*, *26*, 395-417. https://doi.org/10.1007/s10834-005-5904-7

Appendix 1:

Subscales and items of the 'Satisfaction with the childcare center' scale

Situational satisfaction with the childcare center

1. My child has a good time on the childcare center.
2. The staff is loving towards my children.
3. The staff is involved with my children.
4. There are enough interesting toys for my child.
5. I am satisfied with the hygienic conditions on the day care center.
6. The staff has adequate skills to take care for my child.
7. My child gets the right feeding on the day care center.
8. My child sleeps less than necessary on the childcare center.
9. The staff has enough attention for my child when it is upset.

Emotional satisfaction with the childcare center

1. I feel guilty for bringing my child to the day care center.
2. My child goes too often to the day care center.
3. It is good for my child to function in this environment.
4. My child goes less frequent to the day care center than I would like.
5. I find it hard to say goodbye to my child when bringing it to the day care center.

3

The first 12.5 years of parenthood: a latent trait-state occasion model of the longitudinal association between maternal distress and child internalizing and externalizing problems

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Abstract

Maternal anxiety and depression symptomatology are risk factors for the development of children's internalizing and externalizing behavior problems. However, it is still unclear whether chronic and transient symptoms relate differently to child behavior. The aim of this prospective longitudinal study (N=193) was to investigate the associations between anxiety and depression symptomatology in a community sample across the first 12.5 years of parenthood, and children's internalizing and externalizing problems. Maternal anxiety and depression were measured at the child's age of 3, 6, and 12 months, and 2.5, 4, 6, 8, 10 and 12.5 years. At 12.5 years of age, both mothers and children reported on children's internalizing and externalizing problems. Trait-state occasion modeling was used to disentangle the chronic (trait) part of maternal symptomatology from the transient (occasion-specific) part. On average, 66.6% of the variance in maternal anxiety and depression symptomatology could be explained by the chronic trait factor. For both anxiety and depression, the chronic variance in maternal symptomatology was related to mother-reported internalizing, but not externalizing, problems of the child. Also for child-reported internalizing problems, a significant association with maternal anxiety and depression symptomatology emerged. Only the occasion-specific part of maternal depression symptomatology at the child's age of 12.5 years was marginally related to mother-reported internalizing problems. Given that chronic sub-clinical symptomatology seems to be associated with child internalizing problems, prevention and treatment of maternal anxiety and depression symptomatology might be worthwhile regardless of the degree of severity.

Key words: maternal depression, maternal anxiety, postpartum, internalizing problems, externalizing problems, trait-state occasion modeling

Introduction

The period following childbirth often brings joy and happiness, but is also known for its challenges (Missler, Beijers, Denissen & van Straten, 2018). In addition to challenges to well-being (e.g., reduced self-esteem and relationship satisfaction; Van Scheppingen, Denissen, Chung, Tambs, & Bleidorn, 2018), the period can be characterized by symptoms of psychopathology. In community samples, between 8 to 40 percent of all mothers experience at least some symptoms of postnatal depression, while the prevalence of maternal anxiety symptoms postnatally ranges from 13 to 40% (Dennis, Falah-Hassani, & Shiri, 2017; Glasheen, Richardson, & Fabio, 2010; Heron, O'Connor, Evans, Golding, & Glover, 2004; McCoy, Beal, Missler et al., 2020; Shipman, Payton, Watson, 2006; Morris-Rush, Freda, & Bernstein, 2003). Moreover, a considerable proportion of affected women experiences symptoms of both depression and anxiety (Yelland, Sutherland, & Brown, 2010). Maternal postpartum depressive and anxiety symptomatology has been associated with more internalizing problems (such as anxiety and depression), as well as externalizing problems (such as inattentiveness and disruptiveness) in their children (e.g. Brennan, Hammen, Bor, Najman, & Williams 2000; Barker, Jaffee, Uher, and Maughan, 2011; for reviews see Goodman, Rouse, Connell, Robbins Broth, Hall, & Heyward, 2011; Murray, Fearon, & Cooper, 2015; Field, 2018; Glasheen et al., 2010; Rees, Channon, & Waters, 2018). In addition to shared genetic vulnerability, an often proposed mechanism behind these findings is that parents suffering from mental health problems show lower quality of parenting, compromising the development of the child (for a review, see Stein et al., 2014). As the psychosocial functioning of mothers with subclinical depressive symptoms seems to be affected in ways comparable to that of mothers with major depressive disorder (Weinberg et al., 2001), maternal caregiving quality and subsequent child development might also be impacted by sub-clinical symptomatology. Indeed, a study following children of mothers with depressive symptomatology longitudinally for the first eleven years of the child's life found that, at age 16, children of mothers with subclinical symptomatology indicated heightened suicidal ideation compared to children of mothers with minimal to no symptoms (Hammerton et al., 2015).However, much remains unclear regarding how transient periods versus chronic maternal symptomatology affect child behavior. The aim of this study was to investigate the associations between sub-clinical depressive and anxiety symptoms across the first decade of parenthood, and children's internalizing and externalizing problems at 12.5 years of age.

There are indications that children of chronically depressed mothers have more internalizing and externalizing problems than children whose mother had a shorter depressive episode (e.g. Brennan et al.,

2000; Hentges, Graham, Fearon, Tough, & Madigan, 2020; Kingston et al., 2018; Netsi et al., 2018). However, in these studies, chronicity is measured by using the frequency of high symptomatology across a given number of measurement moments (e.g. Brennan et al., 2000; Hentges et al., 2020; see also Prenoveau et al., 2017), or by examining continuous trajectories of maternal symptomatology (Kingston et al., 2018; Netsi et al., 2018). In these cases, chronicity of symptoms is determined based on variation compared to population levels of depression (for example, by using cut-off scores or categories of severity), rather than on the participants' own history of depression. This way of conceptualizing chronicity does not take into account that many psychopathological constructs (such as anxiety and depression) are relatively stable over time (Prenoveau, 2016).

As such, it remains unclear whether a score at a specific time point can be attributed to chronic, trait-like factors, or transient, occasion-specific fluctuations in symptomatology. This distinction is important because trait and occasion symptoms can relate differently to child outcomes (Kingston et al., 2018). Furthermore, this distinction also provides important insights for prevention and intervention studies, as trait and state maternal symptomatology probably warrant different approaches, for example with regard to involving the child in the intervention (Yap, Morgan, Cairns, Jorm, Hetrick, & Merry, 2016).

Differentiation between trait and state symptomatology can be done using latent trait-state occasion (TSO) modeling (Cole, Martin, & Steiger, 2005) which distinguishes between chronic (trait) and transient (state occasion) parts of maternal depressive and anxiety symptomatology at various time points. Thus, the method differentiates between chronic anxiety and depression symptomatology (level of symptomatology that can be expected based on the stability in previous scores), and transient deviations from the score that would be expected based on this stable history. This way, it is possible to detect whether chronic variance in symptomatology is related to child factors, independent of transient fluctuations in symptoms (i.e. a temporarily heightened level of anxiety symptoms). Importantly, the assumption of the TSO-model is that stability in symptomatology decreases with increasing time lapsed between measurements, but never reaches zero. Thus, using the TSO model it is possible to account for the pattern of relative stability of anxiety and depression symptomatology (e.g. Cole, Peeke, Martin, Truglio, & Seroczynski, 1998; Struijs et al., 2020; see also Prenoveau, 2016).

To our knowledge, only one study focused on both state and trait anxiety and depression using the TSO model (Prenoveau et al., 2017). This study focused on child outcomes at two years and showed that not so much the transient periods of elevated depression and anxiety, but especially the chronic part of maternal postpartum symptomatology seemed to be associated with child outcomes. More specifically, only the chronic variance in maternal major depressive disorder and generalized anxiety disorder, as

assessed with a diagnostic interview, was related to more mother-reported behavioral problems of the child at two years of age. Chronic depression was furthermore related to observed emotional negativity at two years. As this study from Prenoveau and colleagues (2017) focused on clinical-level anxiety and depression, and child outcomes at 2 years after birth, it is unclear whether the same relations would emerge in a low-risk sample over longer periods of time.

The current study

This study aimed to investigate the relation between depression and anxiety symptoms in a community sample of mothers throughout the first 12.5 years of parenthood and their children's internalizing and externalizing problems at the age of 12.5 years. Through latent trait-state occasion modeling, the differential associations between chronic (trait) versus transient (occasion) depression and anxiety symptomatology and children's emotional and behavioural development were disentangled. Based on previous research (Brennan et al., 2000; Hentges et al., 2020; Kingston et al. 2018; Netsi et al., 2018; Prenoveau et al., 2017), we hypothesized that chronic maternal depression and anxiety symptomatology would be most strongly associated with children's internalizing and externalizing problems, as compared to transient maternal symptoms.

Method

Participants

Participants were part of an ongoing longitudinal study on psychobiological development in children (BIBO project; Dutch acronym for Basal Influences on Child Development) which started in 2006 and in which mothers and their children are followed from pregnancy onwards (see also Beijers, Jansen, Riksen-Walraven, & De Weerth, 2011). Pregnant women were recruited through midwife practices in the Dutch city of Nijmegen (a mid-sized city in the east of the country) and surrounding areas. Only mothers with healthy, singleton pregnancies, no severe physical diseases or problems with potential risks for the pregnancy or unborn child, no severe mental health problems (i.e., no current treatment or medication use for mental health problems), no drug use, and a clear understanding of the Dutch language were included.

Table 1. *Descriptive statistics of the study variables (N=193)*

	Mean *(SD)*	Range
Demographics characteristics		
Maternal age (years)	32.46 *(3.79)*	21.10–42.90
Maternal educational level (%)		
Primary education	3.80%	
Secondary education	20.40%	
College or university	75.80%	
Maternal marital status (living with partner)	97.90%	
Birth weight (grams)	3616.97 *(465.32)*	2645.00–4730.00
Infant sex* (%)		
Girl	47.20%	
Birth order (%)		
First	41.60%	
Second	43.70%	
Third or fourth born	14.70%	
Pubertal status		
Mother-reported	5.34 (1.92)	2-10
Child-reported	5.53 (1.70)	2-10
Strengths and Difficulties Questionnaire scores (12.5 years)		
Internalizing – Mother (N=151)	2.26 (2.48)	0-12
Internalizing – Child (N=145)	3.39 (2.87)	0-15
Externalizing – Mother (N=151)	3.46 (2.84)	0-14
Externalizing – Child (N=145)	5.25 (2.96)	0-13

** Note: The infant's sex was based on maternal report at baseline*

The ethical committee from the Faculty of Social Sciences of Radboud University Nijmegen approved the 'Basal Influences on Child Development' study (#ECG300107; ECG211111; ECG300107; ECG1303498), and all mothers provided informed consent. Baseline measures took place during the 37th week of pregnancy. Of the 220 mother-infant dyads that enrolled in the study, eight were excluded for medical reasons (e.g.,

prematurity, low birth weight), and another 19 discontinued their participation during the infant's first three months of life for personal reasons. This resulted in a final sample of 193 mothers and their infants. There were no statistically significant differences in demographic factors between the 193 families that took part in the study and the 19 that dropped out. Table 1 displays sample descriptives. The majority of mothers had received higher education (75.80%), lived with their partner (97.90%), and were born in the Netherlands (95.80%). All pregnancies were uncomplicated and children were born at term (>37 weeks of pregnancy) and healthy (Infant Apgar scores ranging from 7 to 10; M= 9.6; SD = 0.6.

Procedure

Mothers filled out questionnaires on their depressive and anxiety symptoms at the child`s age of 3 months, 6 months, 12 months, 2.5 years, 4 years, 6 years, 8 years, 10 years and 12.5 years (by paper-and-pencil in the first stage of the study, and online from 6 years onwards). At 12.5 years of age, both mothers and children independently filled out questionnaires on the child's internalizing and externalizing problems during a home visit.

Measures

Maternal distress

Edinburgh Postnatal Depression Scale. Maternal depressive symptoms were measured with the Dutch translation (Pop, Komproe, & Van Son, 1992) of the self-report 10 item Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987). The items were measured on a 4-point scale. Items are scored from 0 to 3 and total scores range from 0 (no depressed feelings) to 30 (severe depressed feelings). Cronbach's alpha in the current study ranged from .71 (12 months postpartum) to .91 (10 years postpartum). To describe the percentage of mothers at risk for (minor) depression, a cut-off score of 10 or more was used, as is recommended for screening purposes in the general population (Cox et al., 1987; Bergink et al., 2011).

State-Trait Anxiety Inventory. Maternal postnatal anxiety symptoms were measured with the Dutch translation (Van der Ploeg, Defares, & Spielberger, 1981) of the 20-item state anxiety subscale of the State-Trait Anxiety Inventory (STAI; Spielberger, 1983). Items were measured on a 4-point scale. Higher scores indicate more anxiety. Total scores range from 20 to 80. Cronbach's alpha in the current study

ranged from .82 (4 years postpartum) to .94 (10 years postpartum). A cut-off score of > 40 was used to describe the percentage of mothers at risk for postpartum anxiety (Dennis, Coghlan, & Vigod, 2013).

Child social-emotional functioning

Child Strength and Difficulties. Mothers and children reported on child emotional and behavioral problems with the Dutch translation (Widenfelt, Goedhart, Treffers, & Goodman, 2003) of the Child Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). The items refer to both strong points as well as difficulties of the child. The questionnaire contains 25 items, each measured on a 3-point scale (scored 0, 1, or, 2), measuring emotional symptoms, conduct problems, hyperactivity-inattention, peer problems, and prosocial behavior. In this study, the Internalizing (consisting of the Emotional Symptoms and Peer Problems subscales) and Externalizing (consisting of the subscales Conduct problems and Hyperactivity) scales were used (Goodman, Lamping, & Ploubidis, 2010). For maternal report, Cronbach's alpha in the current study was .72 for the Internalizing and .75 for the Externalizing subscales. Cronbach's alpha for the children's report was .70 for the Internalizing and .71 for the Externalizing subscales.

Control variables

We included the following control variables in our analyses: child sex, maternal educational level, and pubertal status. Pubertal status was measured in terms of the Tanner stages questionnaire (Marshall & Tanner, 1969), which tracks the physical development of primary and secondary sex characteristics. Both mothers and children indicated for each sex characteristic which Tanner stage most closely resembled their own physical development, as depicted on a drawing and described by text. We used mother-rated pubertal status for the mother-reported child developmental outcomes, and child-reported pubertal status for the child-reported developmental outcomes.

Statistical Analyses

First, we inspected mean maternal depression and anxiety scores over time and correlations between all study variables, including the percentage of mothers scoring above cut-off for depression (EPDS: >9) and

anxiety (STAI: >40) at each point in time. Also, we examined how often the mothers scored above cut-off for anxiety and depression (range of time points between 0 and 8).

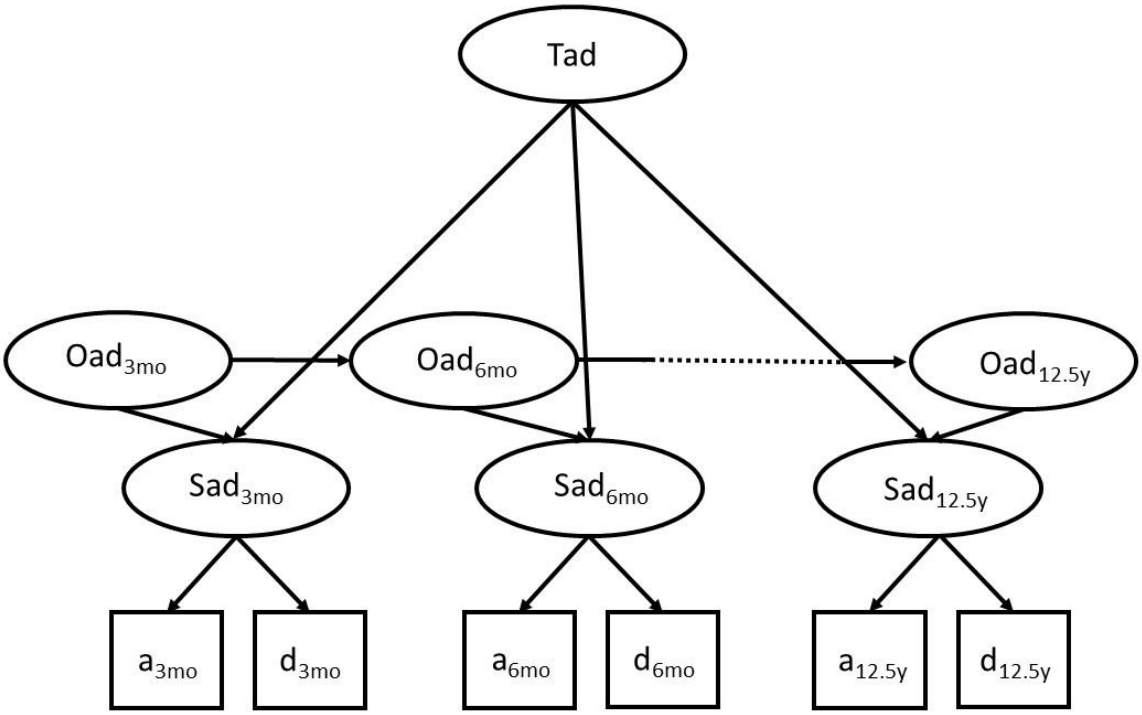
Next, we performed the latent trait-state occasion modeling analysis using R 4.0.1 (R Core Team, 2020) and the R lavaan package for structural equation modeling (Rosseel, 2012). Missing data were handled by using full information maximum likelihood estimation under the assumption of missing at random. Accidentally, one question was omitted from the 6 year EPDS questionnaire. We have imputed this question with the mean of the participant on the remaining nine questions. Model fit was determined based on the root mean square error of approximation (RMSEA) and the comparative fit index (CFI). A RMSEA of less than .08 and a CFI greater than .95 indicates a good fit of the model to the data. Raw data was used as input and maximum likelihood estimates were obtained.

First, a trait-state-occasion (TSO) model without the child outcomes at 12.5 years was estimated (Cole et al., 2005). The TSO model includes a series of latent state factors at specific occasions in time (S_t), which are measured by multiple indicators. S_t is in turn determined by the chronic trait factor (T), as well as by occasion-specific factors (Oad_t; representing situational influences) (Figure 1). The occasion factors refer to transient circumstances that determine S_t, up and above the influence of the chronic trait factor (T). In case of good model fit, the model provides information about which part of the variance in state anxiety/depression can be explained by chronicity in symptomatology (the trait factor) and which part of symptomatology can be attributed to the prior occasion (through an autoregressive pathway that allows correlations between adjacent measurements) and thus refers to transient fluctuations in symptomatology.

The application of the model in this study is based on the TSO model as proposed by Loncke et al (2017). Anxiety and depression scores were combined to reach one latent distress construct for each point in time. Both the anxiety (a) and depression (d) scales functioned as indicators of this latent construct. We created two parcels of five EPDS items for depressive symptomatology (i.e. EPDS items 1-5 as indicator 1, and EPDS items 6-10 as indicator 2). For anxiety symptomatology (as measured by the STAI), we applied the same procedure, thus two parcels of 10 items each were created (items 1-10 and 11-20, respectively). This method has been used before by Loncke et al. (2017), and resembles the approach of Prenoveau et al. (2017). Thus, the severity of maternal symptomatology was indicated by the Sad_t latent state variable (combined state anxiety and depression at a given point in time), indicated by the scores on the four parcels of items on the STAI and EPDS scales. In the model, following Loncke et al (2017), regression coefficients of anxiety/depression with Sad at a given point in time were set at 1 (Figure 1). However, in

contrast to Loncke et al (2017), we did not assume homogeneity of the autoregressive pathways because the measurement moments in this study were not equidistant (i.e. time between measurements increased during the 12.5 years).

Figure 1. *Trait-state-occasion (TSO) model of child outcomes at 12.5 years postpartum as predicted by maternal symptomatology across measurements*



Measurements took place at the child's age of 3, 6, and 12 months, and at 2.5; 4; 6; 8; 10; and 12.5 years. For reasons of clarity, only the first two (3 and 6 months) and the final point in time (12.5 years) are shown. T= trait factor; O = occasion factor; S = state factor; a = anxiety; d= depression; 3m = 3 months after birth; 6mo= 6 months after birth; 12.5y = 12.5 years after birth. The latent variables are indicated by Sad3mo; Sad6mo, and Sad12.5y (i.e. state anxiety/depression at the child's age of 3 months, 6 months, and 12.5 years) and a3m/d3m to a12.5y/d12.5y refer to their manifest indicators (i.e., the two anxiety and two depression parcels). For reasons of clarity, only the first two and the final point in time are shown.

Then, with regression analyses within the structural equation modeling analyses, the relation between maternal symptomatology (the combined anxiety and depression factor) and child outcomes (as reported by the mother and the child) were examined. The child's sex, pubertal status, and maternal educational level were added to the model as control variables. More specifically, to test the hypothesis that the chronic component of maternal symptomatology is related to child internalizing and externalizing problem behavior, both mother-reported as well as child-reported behavior were regressed onto the trait factor. Simultaneously, mother-reported and child-reported outcome variables were regressed on all state occasion factors (at the infant's age of 3, 6, and 12 months, and 2.5; 4; 6; 8;10; and 12.5 years). This was done to test whether there are differences between time points regarding the effect of maternal symptomatology on child development (i.e. internalizing and externalizing problems at the child's age of 12.5 years). As a final step, to detect potential differential associations for anxiety and depression, all analyses were repeated for anxiety and depression separately (using the two indicator parcels for anxiety and the two indicator parcels for depression).

Results

Descriptives

Table 2 shows mean depression and anxiety scores over time. In Figure 2, the percentage of mothers scoring above validated cut-off scores for depression and anxiety at each point in time is displayed. As can be seen, at each wave, roughly 10% of mothers scored above cut-off on depression and/or anxiety. For depression, this percentage was higher at 3 months postpartum (13.90%) and at 2.5 years after birth (13.26%). For anxiety, a higher percentage emerged at 8 years after birth (12.71%), while at 6 months postpartum (4.37%) and at 4 years after birth (6.90%), this percentage was lower. Of the 123 mothers that completed the EPDS at all points in time, 74 never scored above cut-off (60.16%). The STAI was completed by 122 mothers at all waves: of these mothers, 82 (67.21%) never scored above cut-off.

In Table 1, mean scores for the Internalizing and Externalizing subscales as reported by mothers and children at 12.5 years after birth are shown. As can be seen, children's self-reported scores were consistently higher than maternal scores for both the Internalizing (difference in mean = 1.09, t=5.54, p<.00) as well as the Externalizing subscale (difference in mean = 1.78, t=7.63; p<.00).

Table 2. *Depression and anxiety scores over time (mean; standard deviation)*

	Depression			Anxiety		
	N	Mean	SD	N	Mean	SD
3 months	187	5.11	3.73	188	28.99	7.99
6 months	185	4.95	3.66	183	28.36	7.17
12 months	181	5.05	3.81	177	29.11	7.62
2.5 years	181	4.78	3.92	184	30.24	8.22
4 years	175	4.46	3.87	174	28.57	6.90
6 years*	158	5.08	3.30	159	30.90	8.51
8 years	170	4.98	3.87	181	31.54	8.51
10 years	151	4.44	4.42	151	30.79	8.62
12 years	151	4.18	3.64	151	30.50	8.15

** Note: Compared to the measurements at four and eight years after birth, the measurement at 6 years was more extensive, because it consisted not only of questionnaires, but children were also visited at their schools. Not all parents participated in this more extended measurement round.*

Figure 2. *Percentage of mothers scoring >9 at EPDS or > 40 at (STAI) at each measurement*

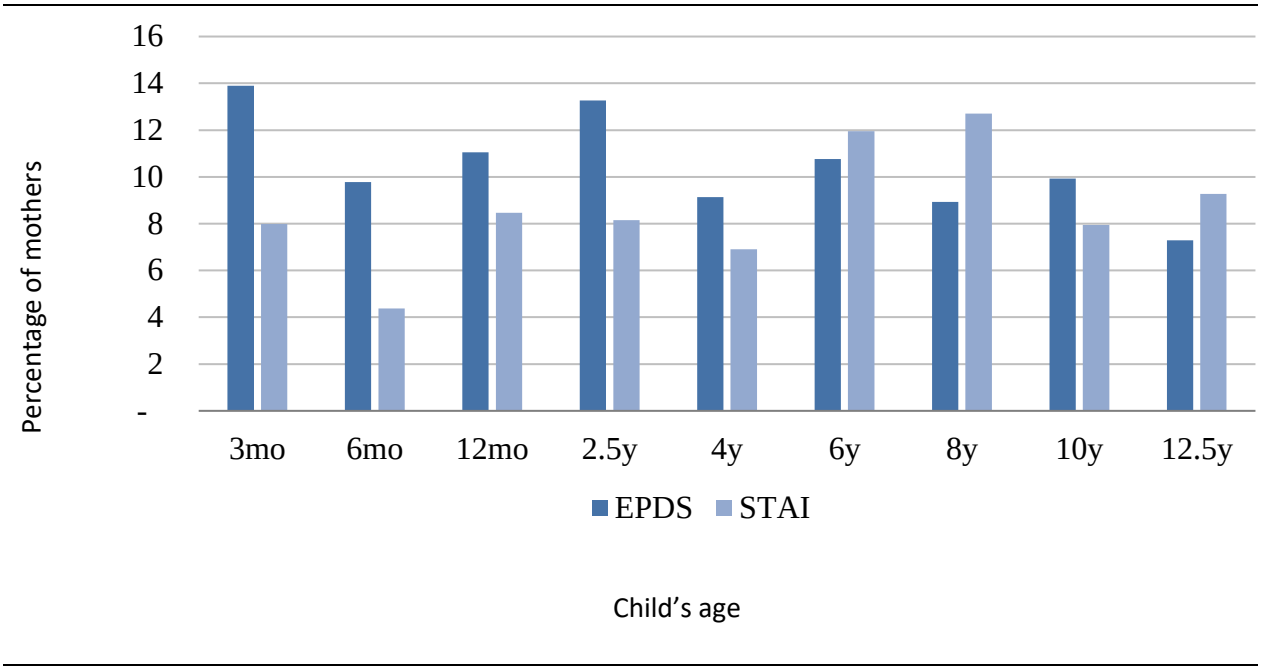


Table 3 displays bivariate correlations between maternal symptoms of depression and anxiety over time, and children's behavior at child age 12.5 years, as reported by the mother and the child. Maternal depressive symptomatology scores and maternal report of child internalizing problems at 12.5 years significantly correlated at all points in time, except at child age 6 years. With regard to maternal anxiety scores, significant correlations with mother-reported internalizing behavior emerged at child age 3, 6 and 12 months, and at 10 and 12.5 years. For externalizing problems, no significant correlations emerged with maternal anxiety or depression symptomatology. When looking at child reports of internalizing and externalizing problems, there was only one significant correlation between maternal depression at 12.5 years and internalizing problem behavior. A higher level of maternal depression symptomatology at 12.5 years was associated with more child-reported internalizing behavior problems. Maternal anxiety was not associated with child-report of internalizing and externalizing problems.

Table 3. *Correlations between depression and anxiety scores across measurements and the SDQ Internalizing and Externalizing scales, as reported by the mother and the child at the child's age of 12.5 years.*

	STAI 3m	STAI 6m	STAI 12m	STAI 2.5y	STAI 4y	STAI 6y	STAI 8y	STAI 10y	STAI 12.5y	SDQ-Int mother	SDQ-Ext mother	SDQ-Int child	SDQ-Ext child
EPDS 3m	.72**									.18*	-.03	.15	-.02
EPDS 6m		.60**								.21*	.03	.16	.01
EPDS 12m			.70**							.17*	.05	.13	.00
EPDS 2.5y				.56**						.20*	.08	.14	.10
EPDS 4y					.56**					.19*	-.06	.11	-.10
EPDS 6y						.42**				.11	.08	.05	.10
EPDS 8y							.74**			.20*	.07	.07	.06
EPDS 10y								.75**		.20*	.03	.20	.07
EPDS 12.5y									.76**	.32**	.04	.18*	-.02
SDQ-Int mother	.18*	.25**	.17*	.15	.14	.14	.21	.18*	.20*				
SDQ-Ext mother	-.01	.10	-.03	.05	.04	.03	.08	.08	-.01	.26**			
SDQ-Int child	.10	.13	.12	.16	.05	.11	.12	.08	.13	.62**	.06		
SDQ-Ext child	.02	.06	-.03	.04	.01	.07	.02	.07	-.02	.22**	.34**	.53**	

Latent trait-state occasion models (TSO)

To estimate the relative contribution of trait and situational (occasion-specific) influences on maternal state symptomatology at a given point in time, first a model without the child outcomes at 12.5 years was estimated. Corresponding percentages can be computed using the completely standardized regression coefficients between trait and state; occasion and state; and between adjacent measurement moments (Prenoveau, 2016). Figure 3 shows the percentage of variance in maternal anxiety/depression symptomatology at a given point in time that can be attributed to the chronic trait factor, as well as the percentage of variance that can be explained by transient influences (the occasion factors). The occasion-specific variance can be decomposed into variance explained through the autoregressive pathway (thus occasion-specific variance determined by symptomatology at the previous time point) and 'unique' or residual occasion-specific variance. As the figure shows, the majority of the variance in maternal anxiety/depression symptomatology at each point in time could be explained by the trait factor, ranging between 52.0% (8 years) and 76.4% (6 months). On average, the trait factor explained 66.6% in maternal anxiety/depression symptomatology. The variance explained by the prior occasion factors ranged from 0.1% (2.5 years) to 4.1% (12 months), with a mean of 1.7%. The unique (residual) occasion-specific variance ranged from 20.2% (12 months) to 45.8% (8 years), with a mean of 31.9%.

The relation between the chronic (trait) and transient (state occasion) parts of maternal symptomatology and child outcomes at the child's age of 12.5 years was estimated through regression analyses within the structural equation modeling framework, including the following potential confounding variables: sex of the child, the child's pubertal status, and maternal educational level. However, simulteanously regressing all occasion-specific factors (Oad3mo to Oad12.5y) on child externalizing and internalizing behaviour resulted in significant multicollineairity and negative variances for the SDQ subscales. Therefore, following Prenoveau and colleagues (2017), we estimated a model including only non-adjacent time points (including the first and final measurement at 3 months and 12.5 years) for mother- and child-reported problem behaviour seperately. Both trait-state occasion models showed a borderline good fit to the data for the combined measure of depression and anxiety (CFI = .88; RMSEA = .07).

Figure 3. *Variance in maternal anxiety/depression symptomatology across measurements on the combined anxiety/depression construct explained by 1) the trait factor, 2) the previous occasion-specific factors (the autoregressive pathway), and 3) unique occasion-specific variance (residual variance).*

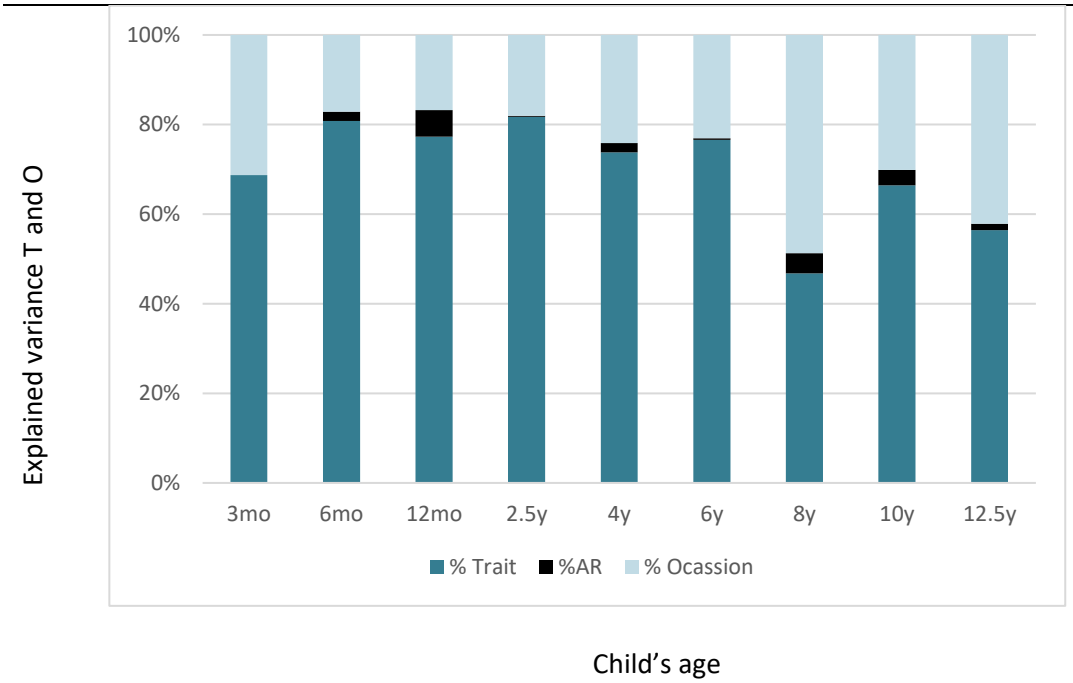


Table 4 shows standardized regression coefficients (β) for the simulteanous regression of non-adjacent occasion factors (3 and 9 months, and 4; 8; and 12.5 years) on child externalizing and internalizing problem behaviour as reported by the mother and the child. As can be seen, there was a trait effect of maternal symptomatology on mother-reported internalizing problems (β= .37, SE= .11, p<.001), indicating that the chronic variance in maternal symptomatology was related to child internalizing problems when the child's was 12.5 years. Thus, an increase of one standard deviation on the combined anxiety/depression trait factor was associated with a .37 standard deviation increase in maternal-reported internalizing problems. For child-reported internalizing problems, the trait effect was also significant (β= .26, SE= .11, *p*=.02). No trait effect emerged for maternal or child-reported externalizing problems, however. With regard to the occasion-specific factors, in the combined anxiety/depression model, no associations with the child outcomes at 12.5 years after birth emerged. Sex, and to a lesser extent pubertal status, emerged as significant confounding variables. More specifically, mothers reported more externalizing problems in boys (β= .17, SE= .09, *p*=.05), and with regard to the children, girls reported more internalizing problems (β= -.31, SE= .09, *p*<.00).

Furthermore, in the depression-only model, mother-reported pubertal onset was positively related to mother-reported internalizing problems of the child.

Table 4. *Standardized regression coefficients (β; SE) for pathways between TSO occasion factors for anxiety/depression across measurements and child internalizing and externalizing behavior (combined model)*

	Oad3mo	Oad12mo	Oad4y	Oad8y	Oad12.5y	Trait
SDQ-Int mother 12.5y	.07 (.12)	-.04 (.31)	.01 (.18)	.09 (.15)	.12 (.13)	.38** (.11)
SDQ-Int child 12.5y	.02 (.12)	.01 (.31)	-.11 (.19)	.03 (.16)	.03 (.14)	.26* (.11)
SDQ-Ext mother 12.5y	-.09 (.12)	-.06 (.33)	-.08 (.19)	.01 (.16)	-.04 (.14)	.02 (.11)
SDQ-Ext child 12.5y	.03 (.13)	-.07 (.33)	-.05 (.20)	.03 (.16)	-.10 (.14)	-.01 (.11)

*Note. β= standardized coefficient for the pathway from the trait-state-occasion model factor (Oad3mo to Oad12.5y) to the child outcome at the child's age of 12.5 years (SDQ Int or SDQ Ext as reported by the mother or the child). SDQ = Strengths and Difficulties Questionnaire; Int = Internalizing subscale; Ext = Externalizing subscale; Oad = combined anxiety/depression occasion factor; ** = p<.01; * =p<.05*

Sensitivity analyses

We also performed separate analyses for anxiety and depression symptomatology. Also in these models, the significant trait effect on mother-reported internalizing problems emerged for both anxiety (β= .27, SE= .10, *p*<.01) as well as for depression symptomatology (β= .30, SE= .11, *p*<.01). For child-reported internalizing problems, the trait effect was marginally significant for depression symptomatology (β= .19, SE= .11, *p*=.10), but not for anxiety. Furthermore, we found a significant relationship between transient maternal depression symptomatology at the child's age of 12.5 years and maternally-reported internalizing problem behaviour (β= .24, SE= .16, *p*=.02). No additional occasion effects emerged for mother-reported or child-reported internalizing or externalizing problems in the anxiety or depression models. As a robustness analysis, we also estimated the combined anxiety/depression and the separate anxiety and depression TSO models including the occasion factors at 6 months and 2.5; 6; and 10 years (results not shown). Model fit indices were the

same as in the original models, and no additional significant relationships emerged between the included occasion factors and the child outcomes.

Discussion

The aim of the current study was to investigate the relationship between maternal anxiety and depression symptomatology throughout the first 12.5 years of parenthood and children's internalizing and externalizing problems at the age of 12.5 years. Children's problems were reported by both mother and child. Using latent trait-state occasion modeling, variance in maternal anxiety and depression symptomatology was decomposed into a chronic (trait) and a transient (occasion-specific) part, and we subsequently investigated whether these parts related differently to child internalizing and externalizing problems. In this community sample, at each point in time, about 10% of mothers scored above cut-off indicating potential clinical anxiety and/or depression symptomatology. The majority of mothers never scored above cut-off for depression (60.16%) or anxiety (67.21%). The results of our trait-state occasion modeling analysis indicated that the majority of the variance in maternal anxiety and depression symptomatology could be explained by the chronic trait factor. This chronic trait part of maternal anxiety and depression symptomatology was related to both mother- as well as to child-reported internalizing problems. For the occasion-specific part, only maternal depression symptomatology at the child's age of 12.5 years was associated with more mother-reported internalizing problems at this age. There were no associations with externalizing problems of the child.

The association between chronic (clinical-level) maternal depression and children's internalizing and externalizing problem behavior at child ages 3-5 years has been found before (Brennan et al., 2000; Netsi et al., 2018; Hentges et al., 2020). However, using the trait-state occasion model (Cole et al., 2005), we could address the limitations of previous studies in operationalizing chronicity (i.e. by defining chronicity regardless of severity and based on mothers' own history of symptomatology). In the only (to our knowledge) other study in which TSO modeling was used to examine associations between trait and state depression and anxiety and child outcomes (Prenoveau et al., 2017), the trait variance in both generalized anxiety disorder and major depressive disorder was related to child internalizing and externalizing problem behavior at the child's age of two years. We partly replicated these findings, in a non-clinical sample of mothers and with children who were markedly older, as we only found associations with internalizing, but not externalizing, problem behavior. Since a relatively

low percentage of mothers in our sample scored above clinical cut-off scores for anxiety and depression, the current study provides further evidence that chronic, sub-clinical, symptomatology may also have consequences for child behavior and development (Kingston et al., 2018). This way, our study builds on previous findings by showing that chronic maternal anxiety and depression symptomatology, regardless of the degree of severity, is associated with children's internalizing problems when they are at the start of adolescence and are transitioning to secondary school (i.e. at the age of 12.5 years).

When assessing maternal symptomatology longitudinally, during a considerable period of time (i.e. 12.5 years), the chronic 'trait' variance in anxiety and depression seems to be mainly responsible for the observed levels of symptomatology. That is, about 66% of the variance in maternal anxiety and depression scores at a specific moment in time could be explained by this chronic source of variance in maternal symptomatology. This percentage is well in line with earlier research into the relative stability of trait anxiety and depression (Struijs et al., 2020). Thus, only a small portion of the variance in maternal symptomatology at a given point in time can be attributed to transient influences. We can only speculate whether transient postpartum symptoms therefore did not have a lasting effect on child development, or that postpartum symptoms stabilized after birth and thus ended up in the trait factor in our analyses. As the birth of a child is a significant life event, challenging parents' available resources over a relatively long period of time (Henshaw et al., 2018; Hong Law et al., 2019; Young et al., 2020), it cannot be excluded that individual differences in how the transition to parenthood is experienced might have a stable influence on trait variance in maternal distress. An important and interesting avenue for future research would be to include multiple measurements of distress during pregnancy, and preferably already before conception. This way, the relative influence of the transition to parenthood on transient vs. stable maternal distress could be captured (for an example in the domain of parental personality, see Denissen, Luhmann, Chung, & Bleidorn, 2019).

Why only the chronic part of maternal symptomatology would be associated with internalizing problems in child behavior was beyond the focus of the current study. However, there are several factors that could explain this association. First, maternal distress is associated with the quality of parenting behavior (Crnic, Gaze, & Hoffman, 2005; Koss & Gunnar, 2018; Stein et al., 2014). The quality of the parent-infant interaction is fundamental for children's healthy development (Osher et al., 2020). One of the most central elements of high-quality parenting is the ability to be sensitive to the child's needs (Stein et al., 2014). Parental sensitivity is related to lower infant stress levels (Albers, Beijers, Riksen-Walraven, Sweep, & De Weerth, 2016), and developmental milestones when children grow older, such as social competence (Sroufe, 2005) and self-regulatory capacities (Bridgett, Burt, Edwards, & Deater-Deckard, 2015; Morawska, Dittman, & Rusby, 2019). Maternal symptomatology could thus

be related to children's internalizing problems through decreased quality of parenting and less sensitivity. Second, the acquisition of internalizing problems through the modelling of parental behavior could play a role. For example, children display increased fear in response to parents' anxious behavior (Bögels & Brechman-Toussaint, 2006). Third, it is possible that a shared genetic susceptibility for developing symptoms of psychopathology could explain the association between the chronic part of maternal symptomatology and children's internalizing problems (Stein et al., 2014; Koss & Gunnar, 2018). This susceptibility could reflect genetic effects, in that mothers who have a chronic predisposition for negative affect are likely to pass on this disposition to their children, who would then be more likely to face problems themselves.

In contrast to previous studies, we did not find an association between maternal symptomatology and externalizing problem behavior of the child. That we only found an association with internalizing problems is consistent with direct genetic transmission because trait negative affect (depression and anxiety) is phenotypically much closer to internalizing problems than to externalizing problems. The differences with previous studies might be explained by differences in the age of children. Previous studies measured children's behavior between ages 2-5 while in our study the children were 12.5 years old. It could be that younger children respond more often with externalizing problem behavior to maternal anxiety and depression symptomatology, while internalizing problems become more salient later on. Indeed, the age of onset of externalizing versus internalizing problem behavior seems to differ. Typically, externalizing problems have an earlier age of onset (Kessler, Amminger, Aguilar-Gaxiola, Alonso, Lee, & Ustün, 2007), and tend to decrease over time during the preschool years (Miner & Clarke-Stewart, 2009). Furthermore, differences in the way children's developmental problems were measured might account for the differences in results with respect to externalizing problem behavior. In two studies (Brennan et al., 2000; Netsi et al., 2018) a total scale encompassing both internalizing and externalizing problems was used, potentially concealing differential associations with internalizing and externalizing problems. To be able to reach robust and generalizable conclusions, future research should apply uniform procedures to measure children's internalizing and externalizing difficulties (see also Achenbach et al., 2016). Since, depending on the child's age, maternal symptomatology might be differently related to children's internalizing and externalizing problem behavior, we recommend using instruments suitable for distinguishing between these types of children's developmental difficulties.

Finally, chronic maternal symptomatology might only lead to externalizing problem behavior in children at the start of adolescence who have a specific vulnerability or susceptibility (diathesis stress or differential susceptibility hypothesis; Belsky 1997a, 1997b; Belsky, 2005). For example, children who received lower quality of care reported more externalizing problems in adolescence when they had a

more negative temperament in infancy (Belsky & Pluess, 2011). Future research should take into account that the association between chronic maternal symptomatology and children's internalizing and externalizing problems might differ depending on specific characteristics of the child (e.g., children's genetic susceptibility; Belsky, & Van IJzendoorn, 2017); adverse experiences such as a traumatic event (Chemtob, Nomura, Rajendran, Yehuda, Schwartz, & Abramovitz, 2010), and also the family context (i.e. concurrent paternal psychopathology (Gutierrez-Galve et al., 2019); or other psychosocial problems within the family).

With regard to the transient fluctuations in maternal symptomatology, only a marginally significant association emerged between maternal depression symptomatology at the child's age of 12.5 years and children's internalizing problems as reported by the mother. For all other ages, no associations between the transient variance in maternal symptomatology and child internalizing or externalizing problems at 12.5 years were found. This confirms that chronic variance in maternal anxiety and depression symptomatology appears more detrimental to child development, compared to transient fluctuations in symptomatology (i.e. the occasion-specific part).

The absence of significant pathways from occasion factors to children's internalizing and externalizing problems might be explained by the time that passed between the measurements of maternal symptomatology and those of children's behavior. With increasing time between adjacent occasion-specific factors (i.e. from 3-6 months, from 6 months to 1 year, and from 1 year to 2.5 years), the autoregressive effect became weaker. It is possible that the association between transient maternal symptomatology and children's internalizing problems is limited to points close in time. This notion is supported by the significant association between the (depression) occasion factor at 12.5 years and children's internalizing problems at 12.5 years. Multiple measurements of child adjustment would be required to empirically test the validity of this explanation.

Alternatively, since the mother-reported association between transient fluctuations in maternal depression symptomatology at 12.5 years and children's internalizing problems were not found in the child-reported measurement, it is possible that the current symptomatology of the mother affected her view of the child's behavior, leading to biased reporting of children's problems (Fergusson, Lynsky, & Horrwood, 1993; Beijers et al., 2020).

Strengths and limitations

The present study has several strengths. First, mothers and children were followed longitudinally, over a considerable period of time (12.5 years), with nine assessments and relatively low drop-out.

Second, at the child's age of 12.5 years, not only the mother reported on the child's development, but also the children themselves. This gave us the opportunity to compare mothers and children's views on the child's developmental problems. The significant difference between mother and child reports of internalizing and externalizing problems underlines the importance of including the child's own observation next to the maternal report (De Los Reyes & Kazdin, 2005; Beijers et al., 2020). However, in our study, we found a much higher correlation between mother- and child-reported internalizing problems compared to externalizing problems. This pattern has been observed before (Madsen et al., 2020). Adding also other observations (such as reports of the other parent, teacher reports, clinical ratings, observational measures of parent-child interaction or social interactions at school) could increase the reliability of measurements of children's internalizing and externalizing problems and result in more fine-grained indices of child adjustment. Third, using trait-state occasion modeling, we were able to use both the trait and occasion variance in maternal symptomatology as separate predictors of children's internalizing and externalizing problems. Using this method, we could (1) account for the pattern of relative stability that is inherent to many psychopathological constructs and (2) prevent chronicity of symptomatology to be confounded with symptom severity, which is a limitation of many previous studies into chronicity of maternal anxiety and depression.

This study also has limitations that are important to note. First, our sample was relatively well-educated, most mothers lived with their partner, and mothers had a relatively low degree of symptomatology across these 12.5 years. This limits the generalizability of our findings to, for example, lower-educated mothers and mothers with risk factors for developing anxiety and depression symptomatology or mothers who already display clinical-level anxiety or depression symptomatology. Second, since we only included child symptoms at age 12.5 years, we were unable to investigate potential bidirectional effects between maternal and child symptomatology over time. Future research could test additional longitudinal models in which trait and occasion-specific variance in children's behavior is compared with trait and occasion-specific variance in maternal distress symptomatology. Third, accumulating research shows that fathers' symptomatology is also associated with children's internalizing and externalizing problems (Kvalevaag, Ramchandani, Hove, Assmus, Eberhard-Gran, Biringer, 2013; Sweeney & MacBeth, 2016). Moreover, there are indications that mothers' and fathers' trajectories of affective symptomatology differ: while maternal symptomatology shows high stability over time, fathers' symptomatology gradually worsens (Hughes, Devine, Foley, Ribner, Mesman, & Blair, 2020), at least for fathers with higher levels of symptomatology (Kiviruusu et al., 2020). Future research should aim to include both mothers and fathers and follow (the interaction of) their symptomatology, as well as associations of trait and occasion parts with child development longitudinally. Fourth, since it is the chronic variance in

maternal symptomatology (regardless of severity) that is related to child behavior, it is likely that a whole range of child outcomes are affected. In future research, a more fine-grained picture of the association between maternal trait and occasion-specific symptomatology and children's long-term development and well-being could be established, by including (1) markers of social-emotional development (peers, social network); (2) cognitive development (cognitive abilities; performance at school); (3) biological measures (brain functioning; stress); and (4) indices of physical and mental health (immune system functioning; clinical disorders).

Conclusion

When following maternal anxiety and depression symptomatology across and beyond the first decade of parenthood, the current study showed that the chronic part of maternal symptomatology (whether mild or severe) is related to children's internalizing problems at the age of 12.5 years. That the chronic variance in maternal symptomatology is related to child behavior indicates that prevention and treatment of maternal anxiety and depression symptomatology is worthwhile for all mothers with stable, enduring symptomatology; regardless of the degree of severity. Future longitudinal research should include both maternal and paternal symptomatology, as well as a wider variety of markers of child adjustment. Moreover, since children report significantly more internalizing and externalizing problems than mothers do, both researchers and practitioners should refrain from relying on the mother only for monitoring children's well-being. Given that the major part of anxiety and depression symptomatology is determined by a chronic underlying trait factor, offering long-term support and preventive interventions to both mothers and children -who risk developing this chronic trait factor themselves-, is of vital importance for their health and development.

References

Achenbach, T.M., Ivanova, M.Y., Rescorla, L.A., Turner, L.V., & Althoff, R.R. (2016). Internalizing/Externalizing Problems: Review and recommendations for clinical and research applications. *Journal of the American Academy of Child & Adolescent Psychiatry*, *55*, 647-656. https://doi.org/10.1016/j.jaac.2016.05.012.

Albers, E.M., Beijers, R., Riksen-Walraven, J.M., Sweep, F.C.G.J., & De Weerth, C. (2016) Cortisol levels of infants in center care across the first year of life: links with quality of care and infant temperament, *Stress*, *19*, 8-17. https://doi.org/10.3109/10253890.2015.1089230

Barker, E.D., Jaffee, S.R., Uher, R. and Maughan, B. (2011), The contribution of prenatal and postnatal maternal anxiety and depression to child maladjustment. *Depression and Anxiety*, *28*, 696-702. https://doi.org/10.1002/da.20856

Beijers, R., Jansen, J., Riksen-Walraven, J., Weerth, C. (2011). Nonparental care and infant health: do number of hours and number of concurrent arrangements matter? *Early Human Development, 87*, 9-15. https://doi.org/10.1016/j.earlhumdev.2010.09.003

Beijers, R., Daehn, D., Shalev, I., Belsky, J., & De Weerth, C. (2020). Biological embedding of maternal postpartum depressive symptoms: The potential role of cortisol and telomere length. *Biological Psychology*, *150*. https://doi.org/10.1016/j.biopsycho.2019.107809.

Belsky, J. (1997a). Variation in susceptibility to rearing influences: An evolutionary argument. *Psychological Inquiry*, *8*, 182–186. https://doi.org/10.1207/s15327965pli0803_3

Belsky, J. (1997b). Theory Testing, effect-size evaluation, and differential susceptibility to rearing influence: The case of mothering and attachment. *Child Development*, *68*, 598-600. https://doi.org/10.1111/j.1467-8624.1997.tb04221.x

Belsky, J. (2005). Differential susceptibility to rearing influences: An evolutionary hypothesis and some evidence. In Ellis, B., Bjorklund, D. (Eds.), Origins of the social mind: Evolutionary psychology and child development (pp. 139–163). New York, NY : Guilford Press

Belsky, J., & Pluess, M. (2011). Differential susceptibility to long-term effects of quality of child care on externalizing behavior in adolescence? *International Journal of Behavioural Development*, *36*, 2-10. https://doi.org/10.1177/0165025411406855

Belsky, J., & Van IJzendoorn, M.H. (2017). Genetic differential susceptibility to the effects of parenting, *Current Opinion in Psychology*, *15*, 125-130. https://doi.org/10.1016/j.copsyc.2017.02.021.

Bergink, V., Kooistra, L., Lambregtse-van den Berg, M.P., Wijnen, H., Bunevicius, R., Van Baar, A., & Pop, V. (2011). Validation of the Edinburgh Depression Scale during pregnancy. *Journal of Psychosomatic Research*, *70*, 385-389. https://doi.org/10.1016/j.jpsychores.2010.07.008.

Brennan, P. A., Hammen, C., Andersen, M. J., Bor, W., Najman, J. M., & Williams, G. M. (2000). Chronicity, severity, and timing of maternal depressive symptoms: Relationships with child outcomes at age 5. *Developmental Psychology, 36*, 759–766. https://doi.org/10.1037/0012-1649.36.6.759

Bridgett, D. J., Burt, N. M., Edwards, E. S., & Deater-Deckard, K. (2015). Intergenerational transmission of self-regulation: A multidisciplinary review and integrative conceptual framework. *Psychological Bulletin, 141*, 602–654. https://doi.org/10.1037/a0038662

Bögels, S.M., & Brechman-Toussaint, M.L. (2006). Family issues in child anxiety: Attachment, family functioning, parental rearing and beliefs. *Clinical Psychology Review*, *26*, 834-856. https://doi.org/10.1016/j.cpr.2005.08.001.

Chemtob, C.M., Nomura, Y., Rajendran, K., Yehuda, R., Schwartz, D. and Abramovitz, R. (2010), Impact of maternal posttraumatic stress disorder and depression following exposure to the September 11 Attacks on preschool children's behavior. *Child Development*, *81*, 1129-1141. doi:10.1111/j.1467-8624.2010.01458.x

Cole, D. A., Peeke, L. G., Martin, J. M., Truglio, R., & Seroczynski, A. D. (1998). A longitudinal look at the relation between depression and anxiety in children and adolescents. *Journal of Consulting and Clinical Psychology*, *66*, 451–60. https://doi.org/10.1037/0022-006X.66.3.451

Cole, D. A., Martin, N. C., & Steiger, J. H. (2005). Empirical and conceptual problems with longitudinal trait-state models: Introducing a trait-state-occasion model. *Psychological Methods, 10,* 3–20. http://dx.doi.org/10.1037/1082-989X.10.1.3

Cox, J.L., Holden, J.M., & Sagovsky, R. (1987). Detection of postnatal depression: development of the 10-item Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry*, *150*, 782–790.

Crnic, K.A., Gaze, C. and Hoffman, C. (2005). Cumulative parenting stress across the preschool period: relations to maternal parenting and child behaviour at age 5. *Infant and Child Development*, *14*, 117-132. http://dx.doi.org/10.1002/icd.384

De Los Reyes, A., & Kazdin, A.E. (2005). Informant discrepancies in the assessment of childhood psychopathology: A critical review, theoretical framework, and recommendations for Further Study. *Psychological Bulletin*, *131*, 483-509.

Dennis, C.L., Coghlan, M., & Vigod, S. (2013). Can we identify mothers at-risk for postpartum anxiety in the immediate postpartum period using the State-Trait Anxiety Inventory? *Journal of Affective Disorders*, *150*, 1217-1220. https://doi.org/10.1016/j.jad.2013.05.049.

Dennis, C., Falah-Hassani, K., Shiri, R. (2017). Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis. *British Journal of Psychiatry*, *210*, 315-323. https://doi.org/10.1192/bjp.bp.116.187179

Denissen, J. J. A., Luhmann, M., Chung, J. M., & Bleidorn, W. (2019). Transactions between life events and personality traits across the adult lifespan. *Journal of Personality and Social Psychology*, *116*, 612–633. https://doi.org/10.1037/pspp0000196

Fergusson, D.M., Lynskey, M.T. & Horwood, L.J. (1993). The effect of maternal depression on maternal ratings of child behavior. *Journal of Abnormal Child Psychology, 21***,** 245–269. https://doi.org/10.1007/BF00917534

Field, T. (2018). Postnatal anxiety prevalence, predictors, and effects on development: a narrative review. Infant Behavior and Development, *51*, 24-32. https://doi.org/10.1016/j.infbeh.2018.02.005

Glasheen, C., Richardson, G.A., Fabio, A., 2010. A systematic review of the effects of postnatal maternal anxiety on children. *Archives of Women's Mental Health*, *13*, 61-74. https://doi.org/10.1007/s00737-009-0109-y

Gjerde, L.C., Eilertsen, E.M., Eley, T.C., McAdams, T.A., Reichborn-Kjennerud, T., Røysamb, E. and Ystrom, E. (2020). Maternal Perinatal and Concurrent Anxiety and Mental Health Problems in Early Childhood: A Sibling-Comparison Study. *Child Development*, *91*, 456-470. https://doi.org/10.1111/cdev.13192

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: a research note. *Journal of Child Psychology and Psychiatry*, *38*, 581–586.

Goodman, A., Lamping, D.L. & Ploubidis, G.B. (2010). When to use broader internalising and externalising subscales instead of the hypothesised five subscales on the Strengths and Difficulties Questionnaire (SDQ): Data from British Parents, Teachers and Children. *Journal of Abnormal Child Psychology*, *38*, 1179–119. https://doi.org/10.1007/s10802-010-9434-x

Goodman, S.H., Rouse, M.H., Connell, A.M., Robbins Broth, M., Hall, C.M., Heyward, D., (2011). Maternal depression and child psychopathology: A meta-analytic review. *Clinical Child & Family Psychology Review*, *14*, 1-27. https://doi.org/10.1007/s10567-010-0080-1

Gutierrez-Galve, L., Stein, A., Hanington, L., Heron, J., Lewis, G., O'Farrelly, C., & Ramchandani, P.G. Association of maternal and paternal depression in the postnatal period with offspring depression at age 18 Years. *JAMA Psychiatry*, *76*, 290–296. https://doi.org/10.1001/jamapsychiatry.2018.3667

Hentges, R.F., Graham, S.A., Fearon, P., Tough, S., & Madigan, S. (2020). The chronicity and timing of prenatal and antenatal maternal depression and anxiety on child outcomes at age 5. *Depression & Anxiety*, *37*, 576– 586. https://doi.org/10.1002/da.23039

Heron, J., O'Connor, T.G., Evans, J., Golding, J., Glover, V., 2004. The course of anxiety and depression through pregnancy and the postpartum in a community sample. *Journal of Affective Disorders*, *80*, 65-73. https://doi.org/10.1016/j.jad.2003.08.004

Hughes, C., Devine, R.T., Foley, S., Ribner, A.D., Mesman, J., & Blair, C. (2020). Couples becoming parents: Trajectories for psychological distress and buffering effects of social support. *Journal of Affective Disorders*, *265*, 372-380. https://doi.org/10.1016/j.jad.2020.01.133

Kessler, R. C., Amminger, G. P., Aguilar-Gaxiola, S., Alonso, J., Lee, S., & Ustün, T. B. (2007). Age of onset of mental disorders: a review of recent literature. *Current Opinion in Psychiatry*, *20*, 359–364. https://doi.org/10.1097/YCO.0b013e32816ebc8c

Kingston, D., Kehler, H., Austin, M. P., Mughal, M. K., Wajid, A., Vermeyden, L., Benzies, K., Brown, S., Stuart, S., & Giallo, R. (2018). Trajectories of maternal depressive symptoms during pregnancy and the first 12 months postpartum and child externalizing and internalizing behavior at three years. *PLoS ONE*, *13*, e0195365. https://doi.org/10.1371/journal.pone.0195365

Kiviruusu O, Pietikäinen, J.T., Kylliäinen, A., Pölkki, P., Saarenpää-Heikkilä, O., Marttunen, M., Paunio, T., & Paavonen, J.E. (2020). Trajectories of mothers' and fathers' depressive symptoms from pregnancy to 24 months postpartum. *Journal of Affective Disorders*, *260*, 629-637.

Kok, R., Thijssen, S., Bakermans-Kranenburg, M.J., Jaddoe, V.W.W., Verhulst, F.C., White, T., Van IJzendoorn, M.H., & Tiemeier, H. (2015). Normal variation in early parental sensitivity predicts child structural brain development. *Journal of the American Academy of Child & Adolescent Psychiatry*, *54*, 824-831. https://doi.org/10.1016/j.jaac.2015.07.009.

Koss, K.J., & Gunnar, M.R. (2018). Annual research review: Early adversity, the hypothalamic–pituitary–adrenocortical axis, and child psychopathology. *Journal of Child Psychology and Psychiatry*, *59*, 327–346. http://dx.doi.org/10.1111/jcpp.12784

Kvalevaag, A.L., Ramchandani, P.G., Hove, O., Assmus, J., Eberhard-Gran, M., & Biringer, E. (2013). Paternal mental health and socioemotional and behavioural development in their children. *Pediatrics*, *131*, 1-7. https://doi.org/10.1542/peds.2012-0804

Loncke et al (2017). Latent state-trait models for longitudinal family data: investigating consistency in perceived support. *European Journal of Psychological Assessment*, *33*, 256–270. https://doi.org /1015-5759/a000415

Madsen, K.B., Rask, C.U., Olsen, J., Niclasen, J., & Obel, C. (2020). Depression-related distortions in maternal reports of child behaviour problems. *European Child & Adolescent Psychiatry*, *29*, 275–285. https://doi.org/10.1007/s00787-019-01351-3

Marshall, W. A. and Tanner, J. M. (1969). Variations in the pattern of pubertal changes in girls. *Archives of Disease in Children*, *44*, 291–303.

McCoy, S.J., Beal, J.M., Shipman, S.B., Payton, M.E., & Watson, G.H. (2006). Risk factors for postpartum depression: A retrospective investigation at 4-weeks postnatal and a review of the literature. *Journal of the American Osteopathic Association*, 106, 193-198.

Miner, J. L., & Clarke-Stewart, K. A. (2008). Trajectories of externalizing behavior from age 2 to age 9: Relations with gender, temperament, ethnicity, parenting, and rater. *Developmental Psychology, 44*, 771–786.

Missler, M.A., Beijers, R., Denissen, J.J.A., Van Straten, A. (2018). Effectiveness of a psycho-educational intervention to prevent postpartum parental distress and enhance infant well-being: study protocol of a randomized controlled trial. *Trials*, *19*, 4. https://doi.org/10.1186/s13063-017-2348-y

Morris-Rush, J.K., Freda, M., Bernstein, P.S., 2003. Screening for postpartum depression in an inner-city population. *American Journal of Obstetrics and Gynecology*, *188*, 1217-1219. https://doi.org/10.1067/mob.2003.279

Morawska, A., Dittman, C.K. & Rusby, J.C. (2019). Promoting self-Regulation in young children: The role of parenting interventions. *Clinical Child and Family Psychology Review, 22***,** 43–51. https://doi.org/10.1007/s10567-019-00281-5

Murray, L., Fearon, P., Cooper, P. (2015). Postnatal depression, mother-infant interactions, and child development - prospects for screening and treatment. In J. Milgrom & A. Gemmill (Eds.), *Identifying Perinatal Depression and Anxiety: Evidence-based Practice in Screening, Psychosocial Assessment and Management* (pp. 139-164). Wiley Blackwell: Oxford.

Netsi, E., Pearson, R.M., Murray, L., Cooper, P., Craske, M.G., & Stein, A. (2018). Association of persistent and severe postnatal depression with child outcomes. *JAMA Psychiatry, 75*, 247–253. doi:10.1001/jamapsychiatry.2017.4363

Osher, D., Cantor, P., Berg, J., Steyer, L., & Rose, T. Drivers of human development: How relationships and context shape learning and development. *Applied Developmental Science*, *24*, 6-36. https://doi.org/10.1080/10888691.2017.1398650

Pop, V.J., Komproe, I.H., & Van Son, M.J. (1992). Characteristics of the Edinburgh Postnatal Depression Scale in The Netherlands. Journal of Affective Disorders, *26*, 105–110. https://doi.org/10.1016/0165-0327(92)90041-4

Prenoveau, J.M. (2016). Specifying and interpreting latent state–trait models with autoregression: An illustration. *Structural Equation Modeling: A Multidisciplinary Journal*, *23*, 731-749. http://dx.doi.org/10.1080/10705511.2016.1186550

Prenoveau, J. M., Craske, M. G., West, V., Giannakakis, A., Zioga, M., Lehtonen, A., Davies, B., Netsi, E., Cardy, J., Cooper, P., Murray, L., & Stein, A. (2017). Maternal postnatal depression and anxiety and their association

with child emotional negativity and behavior problems at two years. *Developmental Psychology, 53*, 50-62. http://dx.doi.org/10.1037/dev0000221

Priel, A., Djalovski, A., Zagoory-Sharon, O. and Feldman, R. (2019). Maternal depression impacts child psychopathology across the first decade of life: Oxytocin and synchrony as markers of resilience. *The Journal of Child Psychology and Psychiatry*, *60*, 30-42. doi:10.1111/jcpp.12880

R Core Team (2020). R: A language and environment for statistical computing. R foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling. Journal of Statisticsl Software, 48, 1-36. http://www.jstatsoft.org/v48/i02/.

Rees, S., Channon, S., & Waters, C.S. (2018). The impact of maternal prenatal and postnatal anxiety on children's emotional problems: a systematic review. *European Child & Adolescent Psychology, 28*, 257-280. https://doi.org/10.1007/s00787-018-1173-5

Spielberger, C.D. (1983). State-trait anxiety inventory for adults. Pao Alto, CA: Consulting Psychologists Press.

Sroufe, A.L. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. *Attachment & Human Development*, *7*, 349-367. https://doi.org/10.1080/14616730500365928

Stein, A., Pearson, R.M., Goodman, S.H., Rapa, E., Rahman, A., McCallum, M., Howard, L.M., Pariante, C.M. (2014). Effects of perinatal mental disorders on the fetus and child. *The Lancet*, *384*, 1800-1819. https://doi.org/10.1016/S0140-6736(14)61277-0

Struijs, S.Y., Lamers, F., Verdam, M.G.E., Van Ballegooijen, W., Spinhoven, P., Van der Doesa, W., Penninx, B.W.J.H. (2020). Temporal stability of symptoms of affective disorders, cognitive vulnerability and personality over time. *Journal of Affective Disorders*, *260*, 77-83. https://doi.org/10.1016/j.jad.2019.08.090

Sweeney S, MacBeth A. (2016). The effects of paternal depression on child and adolescent outcomes: A systematic review. Journal of Affective Disorders, *205*, 44-59. https://doi.org/10.1016/j.jad.2016.05.073

Van der Ploeg, H. M., Defares, P. B., & Spielberger, C. D. (1981). *Een Nederlandstalige bewerking van de Spielberger State – Trait Anxiety Inventory [A Dutch adaptation of the Spilberger's State – Trait anxiety inventory].* Lisse: Swets and Zeitlinger.

Van Scheppingen, M. A., Denissen, J. J. A., Chung, J. M., Tambs, K., & Bleidorn, W. (2018). Self-esteem and relationship satisfaction during the transition to motherhood. *Journal of Personality and Social Psychology*, *114*, 973–991.

Van Widenfelt, B.M., Goedhart, A.W., Treffers, P.D.A., & Goodman, R. (2003). Dutch version of the Strengths and Difficulties Questionnaire (SDQ). *European Child & Adolescent Psychiatry*, *12***,** 281–289. https://doi.org/10.1007/s00787-003-0341-3

Yap, M.B.H., Morgan, A.J., Cairns, K., Jorm, A.F., Hetrick, S.E., & Merry, S. (2016). Parents in prevention: A meta-analysis of randomized controlled trials of parenting interventions to prevent internalizing problems in children from birth to age 18, *Clinical Psychology Review*, *50*, 138-158. https://doi.org/10.1016/j.cpr.2016.10.003.

Yelland, J., Sutherland, G., Brown, S.J. (2010). Postpartum anxiety, depression and social health: findings from a population-based survey of Australian women. *BMC Public Health*, *10*, 771. https://doi.org/10.1186/1471-2458-10-771

4

Universal prevention of distress aimed at pregnant women: a systematic review and meta-analysis of psychological interventions

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Abstract

Background: There is sufficient meta-analytic evidence that antenatal interventions for women at risk (selective prevention) or for women with severe psychological symptoms (indicated prevention) are effective in reducing postpartum distress. However, women without risk or severe psychological symptoms might also experience distress. This meta-analysis focused on the effectiveness of preventive psychological interventions offered to universal populations of pregnant women on symptoms of depression, anxiety, and general stress. Paternal and infant outcomes were also included.

Method: We included 12 universal prevention studies in the meta-analysis, incorporating a total of 2,559 pregnant women.

Results: Overall, ten studies included depression as an outcome measure, five studies included stress, and four studies anxiety. There was a moderate effect of preventive interventions implemented during pregnancy on the combined measure of maternal distress (d=.52), on depressive symptoms (d=.50), and on stress (d=.52). The effect on anxiety (d=.30) was smaller. The effects were not associated with intervention timing, intervention type, intervention delivery mode, timing of post-test, and methodological quality. The number of studies including partner and/or infant outcomes was too low to assess their effectiveness.

Conclusions: This meta-analysis suggests that universal prevention during pregnancy is effective on decreasing symptoms of maternal distress compared to routine care, at least with regard to depression. While promising, the results with regard to anxiety and stress are based on a considerably lower number of studies, and should thus be interpreted with caution. More research is needed on preventing other types of maternal distress beyond depression. Furthermore, there is a lack of research with regard to paternal distress. Also, given the large variety in interventions, more research is needed on which elements of universal prevention work. Finally, as maternal distress symptoms can affect infant development, it is important to investigate whether the positive effects of the preventive interventions extend from mother to infant.

Systematic review registration number: International prospective register of systematic reviews (PROSPERO) registration number: CRD42018098861

Key words: universal prevention; pregnant women; maternal distress; psychological interventions

Background

For many women, the period surrounding childbirth is accompanied by distress. Indeed, the prevalence of postpartum maternal distress symptomatology ranges from 8-40% for depression (Heron et al. 2004; Yelland et al. 2010; McCoy et al. 2006; Morris-Rush et al. 2003) and 13-40% for anxiety (Glasheen et al. 2010; Field, 2018). In turn, these types of distress have been related to problems in children's emotional, behavioural, and cognitive development (e.g. Brennan et al. 2000; Field et al. 2018; Murray et al. 2015). Preventing maternal distress will thus enhance both maternal and child well-being and health. The aim of the current review was to systematically review the evidence on the effectiveness of preventive interventions on distress offered to pregnant women.

The focus in most prevention studies of postpartum distress has been on *indicated* (or secondary) and *selective* (or primary) prevention. Indicated prevention means that an intervention is focused on pregnant women who already display symptoms of a psychological disorder without fulfilling the criteria for a full-blown disorder (e.g. Bittner et al. 2014; Austin et al. 2008). Selective prevention is aimed at pregnant women at risk for developing a disorder, for example women with a history of psychopathology, pregnancy complications, adverse life events, or low social support (e.g. Bayrampour et al. 2018; Dennis et al. 2017; Doyle et al. 2017; Zlotnick et al. 2006; Zlotnick et al. 2016). Previous reviews and meta-analyses have suggested that both indicated (Clatworthy, 2012; US Preventive Service Task Force, 2019), as well as selective prevention (Sockol et al. 2013; Sockol 2015; Sockol, 2018) during the perinatal period are effective for the prevention of depression symptomatology. Even though research indicated that anxiety disorders might be more prevalent than depressive disorders during the perinatal period (Fairbrother et al., 2016), much less is known about the effects of indicated and selective prevention on other disorders or symptomatology beyond depression, such as anxiety and stress. Recent reviews indicated that the few studies that have been done were either not effective (Evans et al. 2018), or that the number of available studies was too low to be able to assess their effectiveness properly (Sockol, 2018).

In contrast to indicated and selective prevention, *universal* prevention is aimed at all women regardless of their risk status or symptoms. Given the relatively high level of maternal distress symptomatology after birth that prenatal symptoms likely continue in postpartum symptoms (Murray et al. 2015), and that postpartum distress might affect sensitive parenting important for a whole range of child outcomes (De Wolff & Van IJzendoorn, 1997; Landry et al. 2006; Sroufe, 2005; Stein et al. 2014), a preventive approach aimed at all pregnant women might be valuable, for both mother and

child. Moreover, it is important to intervene as early as possible, preferably before birth, since parental distress symptomatology can impact child development from birth onwards (Feldman, Eidelman, & Rotenberg, 2004; Hechler, Beijers, Riksen-Walraven, & De Weerth, 2019). However, little is known about the effectiveness of universal prevention of symptoms of depression, anxiety and stress during pregnancy (Evans et al. 2018; Sockol, 2018).

Therefore, the aim of the current study was to systematically review and meta-analyze the available evidence on the effectiveness of preventive interventions on symptoms of depression, anxiety, and stress offered to *universal* populations of pregnant women compared to routine care. Previous meta-analyses included, but did not systematically investigate and differentiate, universal preventive psychological interventions (Sockol 2015; 2018; Fontein-Kuipers et al. 2014; Taylor et al. 2016). Moreover, this review will be the first to also include partner and infant outcomes. The prevalence of fathers' symptomatology is estimated to be about 10% for mild to moderate depression (Paulson et al. 2006; Rao et al., 2020) and/or anxiety disorders (Matthey et al. 2003). As both maternal and paternal distress symptoms can impact infant development (Goodman et al. 2011; Kvalevaag et al. 2013; Murray et al. 2015; Sweeney & MacBeth, 2016), it is important to investigate whether effects of universally applied psychological interventions extend from the parents to the infant.

Method

Protocol and registration

This meta-analysis has been prospectively registered at the international prospective register of systematic reviews: Prospero (https://www.crd.york.ac.uk/prospero/, ID: CRD42018098861).

Information sources and search

A comprehensive literature search was performed in the bibliographic databases PubMed; Embase; Ebsco/PsycINFO; Ebsco/CINAHL; and Wiley/Cochrane Library in collaboration with a medical librarian. Databases were searched from inception up to 15 November 2018. The following terms were used (including synonyms and closely related words) as index terms or free-text words: "Parents", "Pregnancy", "Prevention", "Education", "Cognitive therapy", "Stress", "Anxiety", "Depression", "Well-being", "RCTs". The search was performed without date, language or publication status

restriction. Duplicate articles were excluded. The full search strategies for all databases and the number of identified items per database can be found in Additional File 1.

Eligibility criteria

The following eligibility criteria were applied during the data collection process: (a) randomized controlled trials; (b) testing psychological interventions for pregnant women (with or without inclusion of their partner); (c) starting prenatally; (d) aimed at preventing maternal depression, anxiety and/or stress (e) comparing the active condition with care-as-usual, placebo or waitlist and (f) published in English in (g) international peer-reviewed journals. Care-as-usual could consist of regular consults with professionals in (prenatal) health care, such as midwives, general practitioners, or obstetric nurses. These consults are typically focused on monitoring the health of the mother and the fetus and on providing information about pregnancy and the delivery. Except for the psychological character of the interventions, there were no specific criteria for eligibility. Examples of (elements of) interventions that could be included are: psychoeducation, relaxation techniques, mindfulness, and social support. The interventions could be implemented through education materials (booklets, websites, or videos), individual meetings, group meetings, home visits, or combinations of these. Trials were excluded if they were aimed at indicated prevention (pregnant women with pre-existing psychopathology following DSM-IV or scoring above cut-off on validated clinical measures such as the Edinburgh Postnatal Depression Scale (EPDS, Cox et al., 1987) or at selective prevention (aimed at pregnant women with a high risk to develop psychopathology such as low-income pregnant women, teenage pregnancies, or HIV positive pregnant women). Furthermore, studies reporting insufficient outcome data to calculate effect sizes were excluded (such as the non-reporting of standard deviations, or the reporting of plotted data only).

Data collection process

After our literature search, we removed duplicates. Two independent assessors (MM and TD) examined the titles and abstracts. The full-text of all remaining potentially eligible papers was retrieved after which the selection of studies, based on the above eligibility criteria, was done by two researchers (MM for all studies and MC or CM for half of the studies). Differences between the two raters were solved by discussion. In case of disagreement, the paper was discussed with the other members of the review team (AvS and/or TD) until consensus was reached. For data extraction, a piloted standardized form was used. This form included the following categories: study characteristics, risk of bias

assessment, and data to calculate effect sizes. Study characteristics that were coded are: 1) year of publication; (2) country (high/low income); 3) participant characteristics (*N*, age, SES), 4) inclusion of the partner (yes/no); 5) type of intervention (psychoeducation, cognitive-behavioural therapy (CBT), mindfulness, or another intervention); 6) timing of the intervention (prenatal or a mix of prenatal and postnatal implementation); 7) delivery method of the intervention (individual, group, or mixed format); 8) materials used (e.g. booklet or video); 9) number of sessions; 10) training and supervision of the providers of the intervention (type and frequency of training); 11) method of recruitment (ads, hospital, midwives, other); 12) type of control group and/ or characteristics of the alternative treatment (wait-list, care-as-usual, alternative intervention); 13) type of randomization and number of arms; and 14) primary and secondary outcomes of the study.

Risk of bias in individual studies

Risk of bias was assessed with The Cochrane Risk of Bias Assessment Tool (Higgins & Green, 2011). This tool consists of the following criteria: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data and selective reporting. Again, two researchers (MM, and MC or CM) independently assessed risk of bias for each study. Discrepancies in ratings between the two researchers were resolved by discussion, led by a third researcher (AvS or TD).

Statistical analysis

We performed a random-effects meta-analysis, using the 'Comprehensive Meta-analysis' software package for Windows (CMA; version 3; available from www.metaanalysis.com). To calculate the pooled effect size of the intervention, we used the post-test measures of different measures of distress and expressed them in Cohen's *d* (Cohen, 1988). This value refers to the number of standard deviations the intervention group scores better (or worse) than the control group. An effect size of 0.20 can be considered as small, of 0.50 as moderate, and 0.80 as large (Cohen; 1988). For studies using different instruments measuring the same outcome (i.e. two different depression scales), the outcomes were combined in one effect size per outcome (the mean of the two separate effect sizes). When multiple interventions were compared with a non-treated control group (i.e. Abkarzadeh et al., 2016 and Ramezani et al., 2017), the effect of the intervention was compared to both the active intervention as well as to the control condition. Thus, in this case, we included both comparisons (intervention A – vs. control group and intervention B vs. control group) in our analysis.

First, we calculated the pooled effect size for studies measuring maternal distress, thereby combining depression, anxiety, stress, and/or parenting stress. We checked for outliers (defined as a case in which the 95% confidence interval of an individual study did not overlap with the 95% confidence interval of the overall pooled effect size). After removal of two outliers, we repeated the main analysis. We then repeated the analysis (without the two outliers) on the measures of distress separately, namely depression, anxiety, and (general or parenting) stress.

Statistical heterogeneity was assessed with the I^2-statistic (fixed effects model), which refers to the variance between studies as a proportion of the total variance. High percentages indicate substantial heterogeneity. Numbers-needed-to-be-treated (NNT) were calculated from the effect sizes. Publication bias was examined by a visual inspection of the funnel plot and by Egger's test of the intercept. An estimation of the effect size while taking publication bias into account was performed by means of the Duval and Tweedie trim and fill procedure.

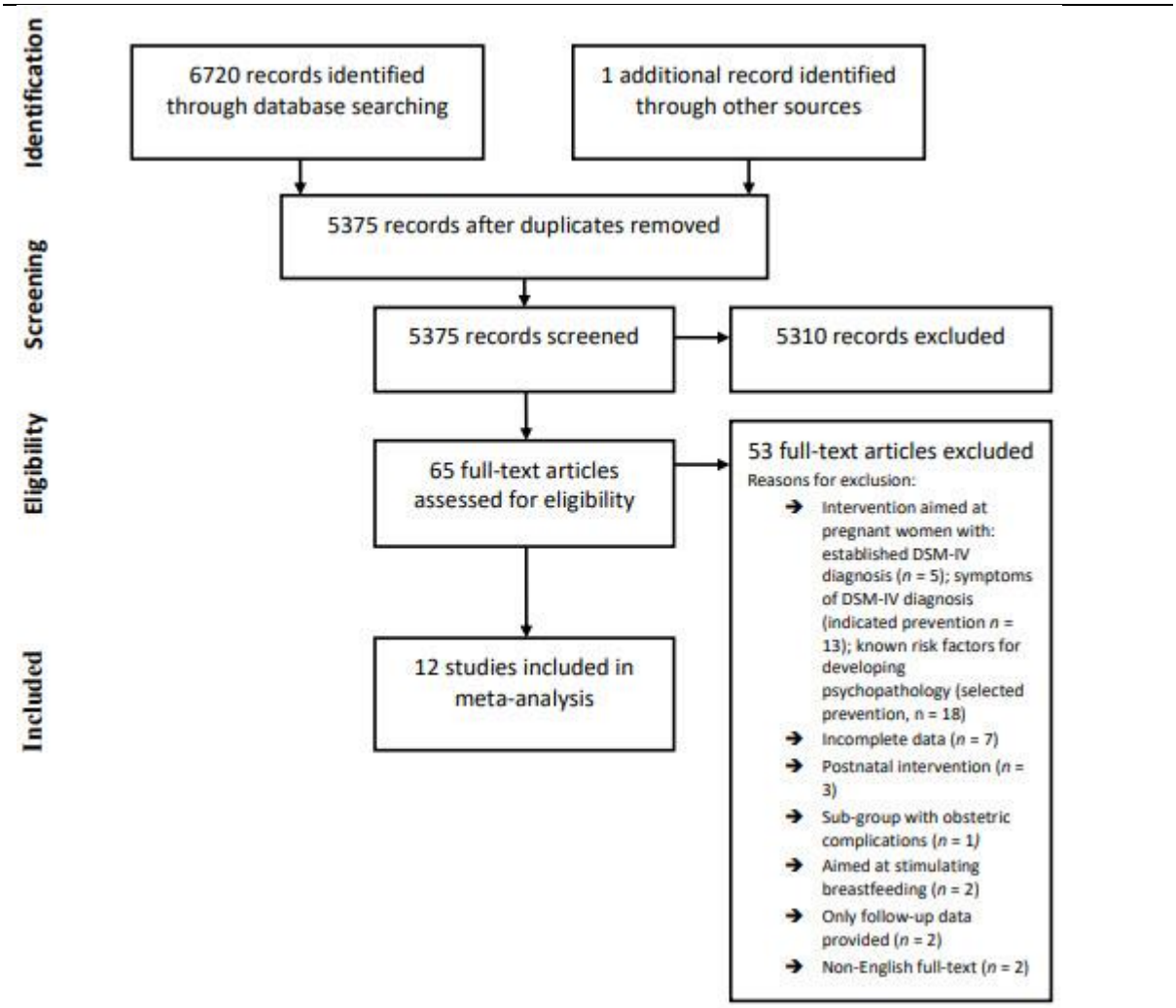
Sub-group analyses on the combined outcome of depression, anxiety and stress, were performed for the following variables: timing of the intervention (prenatal only or a combination of prenatal and postpartum elements); intervention type (psychoeducation; CBT; mindfulness or other interventions); intervention delivery mode (delivered in a group or on an individual basis); whether the partner was included in the intervention; timing of post-test (during pregnancy or in the first 6 months after birth); and methodological quality (based on the risk of bias assessment performed through the Cochrane tool). We used the mixed effect model, which pools studies within subgroups with the random effects model but tests for significant differences between subgroups with the fixed effect model.

Results

Study selection

After removal of duplicates (*n*=1345), titles and abstracts of 5375 references were screened for eligibility (Fig.1). Based on title and abstract, 5310 references were excluded at this stage. For 65 references, we retrieved the full-text. Based on the full-text information, 53 references were excluded, resulting in a final inclusion of 12 universal prevention studies in the meta-analysis (Table 1). These 12 studies incorporated a total of 2559 pregnant women. In 3 studies, the partner also participated (*n* = 360).

Figure 1. *PRISMA flow chart of included studies*



Study characteristics

The 12 included studies were published between 2008 and 2018. Overall, ten studies included depression as an outcome measure, five studies included stress, and four studies anxiety. Four of them focused exclusively on depression, whereas the other six studies also included anxiety and stress. Only two studies focused only on anxiety or stress. Two of the studies (Abkarzadeh et al., 2016b; Ramezani, Khosravi, Motaghi, Hamidzadeh, & Mousavi, 2017) compared more than one intervention group with the control condition, resulting in 14 comparisons. In one study, (Beattie et al., 2017) a newly developed mindfulness intervention was compared with a regular pregnancy support program, while in the other studies a non-treated control condition was used. Most studies (*n* = 9) were performed in high-income countries. In all studies pregnant women were recruited through antenatal clinics of local

hospitals. In one of the studies (Matvienko-Sikar & Dockray, 2018) women were additionally recruited through private clinics and the use of advertisements (online and on paper). With regard to parity, in most of the included studies, only primiparous women were included (n = 7). In three of the remaining studies, the majority of women was expecting their first child. For the other two studies, about one third of the women was primiparous. Given the low number of studies including multiparous women, we decided not to perform subgroup analyses with regard to parity.

The studies we included aimed for universal recruitment. The majority of the studies (*n* = 9) used various indicators of the presence of psychopathology (current or former, diagnosis or symptomatology) as an exclusion criterion. The remaining three studies did not use any indicator of the presence of psychopathology (symptoms or diagnosis) as an explicit exclusion criterion. About 20% to 30% of women scored above a (varying) cut-off score indicating potential depression in three of the studies that did use (a diagnosis of) psychopathology as an exclusion criteria (Matvienko-Sikar & Dockray, 2017; Milgrom, Schembri, Ericksen, Ross, & Gemmill., 2011; Woolhouse et al., 2014) and in two studies which did not use such an exclusion criterion (Daley-McCoy et al., 2015; Haga et al., 2019). Overall, the baseline scores of all studies showed mean depression, anxiety, and stress scores that were well below clinical cut-off, except for the depression scores in one study (Matvienko-Sikar & Dockray, 2017). In this study, participants showed relatively high baseline EPDS scores.

The 14 comparisons included the following interventions: psychoeducation (*n*=3); cognitive-behavioral therapy (*n*=4); mindfulness/relaxation (*n*=4); interpersonal Psychotherapy (IPT; *n* =1); solution-focused counseling (*n*=1*)* and one study (Haga et al., 2019) used an extensive online multimodal intervention consisting of elements of e.g. CBT, mindfulness, and meta-cognitive therapy. The interventions were implemented prenatally only (*n*=10) or took place both before and after delivery (*n*=4). The majority of the studies compared their intervention to routine care (*n*=10), or a supportive intervention resembling routine care (*n*=1). In two studies, an alternative intervention was also compared to a non-treated control group. Only one study used a wait-list control condition. The studies did not report how the intervention and control conditions were presented to the participating women. Only the Woolhouse et al. (2014) study reported that women were informed that they would participate in the evaluation of an intervention to support them in managing their stress levels.

Table 1. *Characteristics of 12 randomized controlled trials of psychological interventions in pregnant women*

author	Year	Country	Intervention type	Outcome(s)	Delivery method	Control	N_{sess}	Inclusion of partner	Timing intervention	N_{pat}	Risk of bias
Akbarzadeh	2016	Iran	Psychoeducation	Anxiety (STAI)	Group	CAU	4	Yes	Prenatal	126 couples	High
Beattie et al	2017	Australia	Mindfulness	Stress (PSS-10); Depression (EPDS)	Group	CAU (Pregnancy Support Program)	8	No	Prenatal	48 women	Low
Daley-McCoy et al	2015	England	Psychoeducation	Depression (EPDS)	Group	CAU	1	Yes	Prenatal	63 couples (70 women and 65 men)	Some concerns
Feinberg & Kan	2008	United States	CBT	Depression (CES-D); Anxiety (TMAS)	Group	CAU (+ child care brochure)	8	Yes	Mixed (4 postnatal sessions)	169 couples	Some concerns
Gao et al	2010	China	IPT	Depression (EPDS; GHQ)	Group (prenatal)/ Individual	CAU	3	No	Mixed (1 postnatal session)	194 women	Some concerns

					(postpartum phone call)					
Haga et al	2019	Norway	Multimodal	Depression (EPDS)	Individual (10-min online self-help sessions)	CAU	44	No	Mixed (11 prenatal sessions)	1342 women	Some concerns
Khorsandi et al	2016	Iran	CBT	Stress (PSS-14)	Group	WL	8	No	Prenatal	64 women	Some concerns
Mao et al	2012	China	CBT	Depression (PHQ-9; EPDS)	Group/ Individual (1 coaching session)	CAU	5	No	Prenatal	240 women	Low
Matvienko-Sikar & Dockray	2017	Ireland	Mindfulness	Stress (PDS); Depression (EPDS)	Self-help	CAU	11	No	Prenatal	46 women	High
Milgrom et al	2011	Australia	Psychoeducation	Depression (BDI-II); Anxiety (DASS); Stress (DASS)	Self-help (workbook)/ individual (phone)	CAU (+ intervention workbook after study)	8	No	Mixed (1 postnatal session)	143 women	Some concerns

Ramezani et al	2017	Iran	CBT	Depression (Austin Inventory; EPDS)	Group	AI (solution-focused counselling) + CAU	4	No	Prenatal	85 women	High
Woolhouse et al	2014	Australia	Mindfulness	Depression (CES-D; DASS); Anxiety (STAI; DASS); Stress (PSS; DASS)	Group	CAU	6	No	Prenatal	32 women	Some concerns

Abbreviations. BDI – Beck Depression Inventory; depression; CAU – care as usual; CBT – cognitive behavioural therapy; CES-D – Center for epidemiological studies, depression scale; DASS – Depression Anxiety Stress scales short form; EPDS – Edinburgh Postnatal Depression Scale; HADS-D – Hospital Anxiety and Depression Scale; GHQ – General Health Questionnaire; LQ = Leverton Questionnaire; IPT – Interpersonal psychotherapy; N $_{pat}$ = number of patients; N_{sess} = number of sessions; PDS – Prenatal Distress Scale; POMS - Profile of Mood States (Depression / dejection scale); PSS – Perceived Stress Scale; SH – self-help; STAI – State and Trait Anxiety Inventory; TMAS – Taylor Manifest Anxiety Scale; WL – waiting list

The number of sessions ranged from 1 to 44. The study with 44 (10 minute) sessions was an outlier with respect to the number of sessions (Haga et al.,2019). The mean number of sessions with this study excluded was 9.08. This was also true for the number of participants (n =1342) in the Haga et al. (2019) study, which was considerably higher than in the other studies (mean number of participants of the other studies was 110). Most interventions were implemented in a group (*n*=9); or used a combined format with prenatal group sessions and additional individual care (e.g. one individual coaching session; *n*=2) Three interventions were offered online in a self-help format. Two of these were unguided (Haga et al., 2019; Matvienko-Sikar & Dockray, 2017) while in one intervention, participants were supported by phone (Milgrom et al. 2011). Most interventions were provided by a professional in (mental) healthcare, namely a midwife (*n*=4); a psychologist (*n*=3); or an obstetrician (*n*=1). In one study, group sessions were facilitated by a trained female-male team from childbirth education departments of local hospitals (Feinberg & Kan, 2008). No information about the facilitators was provided in two studies (Abkarzadeh et al., 2016b; Khorsandi et al., 2016). Most intervention facilitators received a specific training (*n*=9) and to a lesser extent also supervision (*n*=5) during the intervention.

Risk of bias

Of the 12 included studies, four reported an adequate *random sequence generation*. For the remaining studies, the description of this procedure was not sufficient to judge this criterion. Importantly, no significant baseline differences emerged between the intervention and control groups in 11 studies, indicating adequate randomization. One study did not report baseline distress data (Ramezani et al., 2017). In five studies, the *allocation procedure* was adequately concealed, while for six studies, this remained unclear. In one study, there seemed to be problems with the concealment of the random allocation process (Matvienko-Sikar & Dockray, 2017) because the generation of the allocation sequence, the enrollment of participants, and the random allocation were all done by the same researcher. Five studies were judged as low-risk on the *incomplete outcome data* criterion, either because of the use of an intention-to-treat analysis (*n*= 4) or the reporting of a low drop-out rate (defined as at least 80% of the participants completing the intervention and the post-intervention measurements). Conversely, because of relatively high drop-out rates (drop-out rate >20%) and no clear reporting of the reasons for these high drop-out rates, five studies were judged as high risk. Two studies did not report enough information to judge this criterion. For the majority of studies (*n*=9), we were unable to judge whether there was any *selective reporting*. The availability of a study protocol or trial registration justified a low-risk judgement for two studies only. One study was assessed as high

risk. Concerning potential *other sources of bias*, only one study was judged as high-risk because of unclarities in the reporting of the study (mainly with regard to analysis methods). There were no clear indications for the presence of *researcher allegiance* in the included studies.

Synthesis of results

Main analysis: effect of the interventions on maternal distress

The overall effect of preventive psychological interventions implemented during pregnancy on different measures of maternal distress (depression, anxiety, and stress) was considerable (Cohen's *d*=.52; 95% CI .29 ~ .74; Table 2). The I^2 statistic showed a large (and significant) percentage of heterogeneity of 76%. Two studies resulted in considerable higher effect sizes than the other included studies, and could thus be considered outliers (Haga et al., 2019; Khorsandi et al., 2016). The removal of these two outliers resulted in a somewhat smaller effect size of *d*=.47 (95% CI .31 ~ 0.62) and a considerable decrease in the percentage of heterogeneity (I^2 = 27%, non-significant). To limit this heterogeneity, we decided to perform all analyses without the two outlying studies. When looking at the distress outcomes separately, substantial effect sizes were obtained for depression (*n*=10; *d*=.50; 95% CI .32 ~ .67), stress (*n*=5; *d*=.52; 95% CI .28 ~ .75) and anxiety (*n*=4; *d*=0.30; 95% CI <0.01 ~ 0.59). Heterogeneity was low in these analyses for the separate outcomes.

Some studies reported more than one effect size because they included more than one measure to report an outcome (e.g. two different depression measures). In these cases, we used a pooled effect size in the above analyses. However, we also conducted sensitivity analyses, in which we included only one comparison for each study. First, for each study, we only included the comparison with the largest effect size. Then, we analyzed only the comparison with the smallest effect size. The resulting overall effect sizes were comparable to the overall effect size (Table 2). However, when including only the comparisons with the highest effect size, the percentage of heterogeneity increased to a moderate level (though again non-significant).

Sub-group analyses

The sub-group analyses for intervention timing, intervention type, intervention delivery mode, timing of post-test, and methodological quality did not show statistically significant differences on the

combined outcome of maternal distress (Table 2). Only one subgroup analysis produced a statistically significant difference: interventions which did not include the partner showed a larger effect on maternal distress (*d*=.59) than studies that did include the partner (*d*=.25; p<.01; Table 2).

Table 2. *Psychological interventions vs care-as-usual control groups for preventing distress among pregnant women: effect sizes*[a]

	N_{comp}	d	95% CI	p-value	I^2	NNT
All studies	14	0.52	0.29 ~ 0.74		76.14*	3.50
2 outliers removed	12	0.47	0.31 ~ 0.62		26.56 ns	3.85
Lowest ES excluded[b]	12	0.50	0.36 ~ 0.64		14.9 ns	3.62
Highest ES excluded[b]	12	0.43	0.25 ~ 0.61		41.54 ns	4.20
Depression only[b]	10	0.50	0.32 ~ 0.67		26.99 ns	3.62
Anxiety only[b]	5	0.30	<0.01 ~ 0.59		43.03 ns	5.95
Stress only[b]	5	0.52	0.28 ~ 0.75		00.00 ns	3.50
Timing intervention[b]				0.63		
• Prenatal	9	0.52	0.36 ~ 0.68		07.32 ns	3.50
• Mixed	3	0.37	0.16 ~ 0.58		60.95 ns	4.85
Intervention type[b]				0.54		
• Psychoeducation	3	0.34	0.03~0.65		22.77 ns	5.26
• CBT	3	0.43	0.24 ~ 0.62		66.23 ns	4.20
• Mindfulness	3	0.32	-.14 ~ 0.78		0.00 ns	5.56
• Other	3	0.62	0.39 ~ 0.84		43.81 ns	2.96
Delivery mode[b]				0.54		
• Group	10	0.45	0.32~0.58		34.52 ns	4.00
• Individual	2	0.61	0.13~1.10		00.00 ns	2.99
Inclusion of partner[b]				<0.01		
• No	8	0.59	0.43~0.75		0.00 ns	3.09
• Yes	4	0.25	0.04~0.45		0.00 ns	7.14

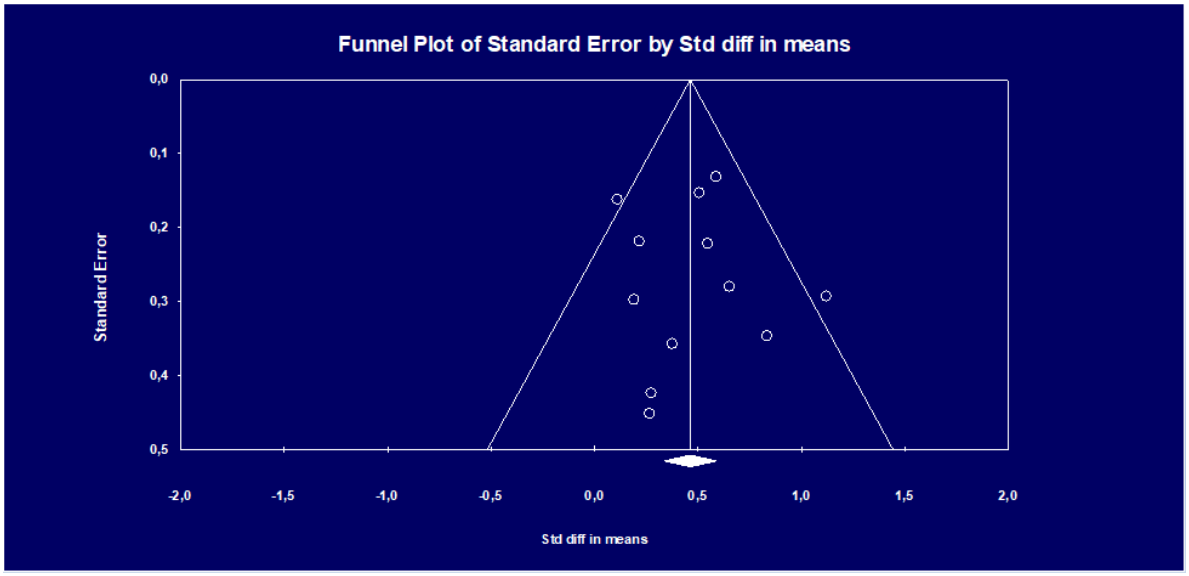
Risk of bias[b]				0.40		
• High	5	0.55	0.32~0.78		38.08 ns	3.31
• Low	2	0.56	0.32~0.81		00.00 ns	3.25
• Medium	5	0.35	0.16~0.54		26.78 ns	5.10
Timing post-test[b]				0.93		
• Pregnancy	5	0.48	0.30~0.67		0.00 ns	3.76
• 0-6 m pp	7	0.45	0.27~0.62		51.54 ns	4.00

[a] random effect models; [b] analysis did not include four outliers (Khorsandi; Haga); N_{comp} = number of comparisons; ns: not statistically significant; NNT Numbers Needed to Treat

Publication bias

We tested for publication bias on the maternal distress outcome data first by visually inspecting the funnel plot (Figure 2). The plot was symmetrical, indicating no publication bias. This was confirmed by Egger's test of the intercept (*p*=.83), which indicated no asymmetry of the funnel plot. The Duval and Tweedie trim and fill procedure indicated that no studies needed to be imputed.

Figure 2. *Funnel plot of standard error by effect size (Cohen's d) in studies comparing preventive psychological interventions aimed at preventing maternal distress with non-treated control conditions in universal populations of pregnant women*



Partner and infant outcomes

Unfortunately, it was not possible to synthesize outcomes with regard to partners since only three of the included studies included the partner in the interventions (Abkarzadeh et al., 2016b; Feinberg & Kan, 2008; Daley-McCoy et al., 2015) and only two of these studies (Feinberg & Kan, 2008; Daley-McCoy et al., 2015) reported the partner's distress outcomes. No effect of the intervention on paternal depression and anxiety was found in Feinberg and Kan (2008), while women from the intervention group did report lower levels of distress than women from the control group (effect size .56 for depression; and .38 for anxiety). However, Daley-Mccoy et al (2015) reported a significantly greater reduction in symptoms of depression for men (compared to the control group) in their psychoeducational intervention group aimed at the transition to parenthood, with a considerable effect size of .47. For women, no difference emerged between the intervention and the control group.

We were also unable to synthesize the effects of the interventions on the infant, as only three of the included studies assessed infant outcomes and the assessed outcomes showed too much variability. One of the studies measured the daily number of fetal movements (as a marker of maternal-fetal attachment; Abkarzadeh et al 2016b), one measured parent-child dysfunctional interaction and infant regulatory competence (Feinberg and Kan, 2008) and one measured birth outcomes (e.g. complications during delivery; mode of birth; Beattie et al 2017). The results were mixed. Beattie et al. (2017) did not find any effect on birth outcomes and the other two studies only for part of the measurements or for specific subgroups. More specifically, in the Feinberg and Kan (2008) study, parents from the intervention group reported levels of dysfunctional interaction and distress in the relationship with their child around 6 months postpartum. Interestingly, the effect size for fathers (.70) was large (.34 for mothers). Furthermore, infants from the intervention group showed a longer duration of orienting (mother and father report aggregated) and greater soothability (father report only) at 6 months postpartum. With regard to fetal movements, Abkarzadeh et al (2016b) reported that in both intervention groups (psychoeducation about attachment and a relaxation intervention), the number of counted movements increased (compared to the control group). This increase was only statistically significant for the educational attachment intervention group (and not for the relaxation group).

Discussion

This meta-analysis focused on the effectiveness of preventive psychological interventions offered to universal populations of pregnant women on symptoms of depression, anxiety, and general stress. Paternal and infant outcomes were also included. The meta-analysis suggested that psychological interventions among pregnant women without a specific risk of psychopathology and implemented during pregnancy, are effective in the prevention of maternal distress symptomatology. The meta-analysis showed that these interventions have a moderate effect on the combined measure of distress (d=.52) as well as on depressive symptoms (d=.50), and stress (d=.52). The effect on anxiety (d=.30) was somewhat smaller. These results indicate that, next to indicated and selected prevention, universal prevention has value in its own right. Since the results with regard to anxiety and stress are based on a considerably lower number of studies, the effectiveness of universal prevention on the prevention of distress beyond depression should be interpreted with caution.

Two studies were outliers and thus excluded (Haga et al., 2019: Khorsandi et al., 2016). These studies differed from the other studies in several respects. The Haga et al. (2019) study was the only study in which a multimodal intervention was tested, consisting of elements of meta-cognitive therapy, mindfulness, acceptance and commitment therapy, positive psychology, cognitive-behavioral therapy, and psychoeducation. The online intervention consisted of 44 sessions. While these sessions took not much time to complete (about 10 minutes), the number of sessions was much higher than in the other studies. It is possible that the high number of sessions, but also the multimodal nature of the intervention, explain why this study found a much larger effect size than the other studies. It might be that by offering multiple elements of different interventions and therapies, women can choose those elements that work best for them to alleviate distress symptoms. The intervention in the Khorsandi et al. (2016) study differed from the other interventions as it was exclusively focused on stress, namely psychoeducation about stress and how to handle signals of stress. The content seemed to be not exclusively geared to pregnant women, while this was the case for the other included interventions. Moreover, it was difficult to assess the methodological quality of this study. For example, no flow chart and no info on timing of measurements was reported. Also, lack of active and regular participation in the training stages of the intervention was described as an exclusion criterion. It is not clear if this criterion actually resulted in exclusion of participants, but if so, the sample could be biased towards more highly motivated women (potentially leading to a higher effect size). It is important to emphasize that exclusion of these two studies lead to more conservative effect estimates. As a result, the true effects might even be higher than the ones we reported.

The studies we included were aimed at universal prevention. The majority of the included studies (*n*=9) excluded women with a diagnosis of anxiety or depression, or women who scored above a cut-off on questionnaires. The remaining three studies included all pregnant women (and their partners) regardless of pre-existing symptomatology or risk status, but did not exclude women with a diagnosis or (severe) symptoms. The overall mean baseline scores of all studies showed that the women had some symptoms, but that the depression, anxiety, and stress scores were well below clinical cut-off. While indicated and selected prevention efforts are exclusively aimed at women who are screened on their (considerable) level of distress symptomatology (using validated cut-off scores), or their relative risk on developing psychopathology based on the presence of one or more known risk factors (e.g. pregnancy complications, low social support), universal prevention targets those women who have no known risk factors and experience low to moderate levels of distress. The current analysis suggested a considerable effect on symptoms of depression, anxiety, or general stress for these women, indicating the added value of universal prevention of distress in pregnancy.

The included preventive interventions varied from (online) mindfulness-based self-help interventions to interventions consisting of multiple group sessions based on principles of established therapeutic techniques, such as cognitive-behavioural therapy (problem solving and communication skills) and interpersonal psychotherapy (underlining the importance of social relationships). Most interventions were exclusively aimed at pregnant women and included psychoeducation about postnatal distress, relaxation techniques and the acquisition of emotion regulation skills. Also, most interventions were offered in a group setting (in a local hospital) and facilitated by a mental health professional or a midwife. A minority of interventions was offered in a (internet-based) self-help format. A subset of interventions also offered postnatal sessions: these interventions were also aimed at the couple relationship and/or the transition to parenthood. We could not demonstrate that one type of intervention was more effective than the other types. However, due to the high heterogeneity among the interventions and the small number of studies per type of intervention, the analyses might have lacked sufficient power to demonstrate differences in effect.

When considering the three indicators of distress separately, we found considerable effect sizes for depression (*d*=.50), stress (*d*=.52), and a somewhat lower effect size for anxiety (*d*=.30). This implies that the interventions were effective on all three indicators of distress. Moreover, analyzing the indicators of distress separately resulted in less heterogeneity. It is important to keep in mind that most of the included studies focused on symptoms of depression (*n*=10), and that the results for symptoms of stress and anxiety were based on a considerably lower number of studies (*n*=4).

The impact of universal prevention on symptoms of *depression* is in line with conclusions of earlier reviews and meta-analyses showing the effectiveness of selected and indicated prevention for depression and depressive symptomatology (Sockol et al., 2013; Sockol, 2015; 2018; Clatworthy, 2012). For example, one of the studies (Mao et al., 2012) in our meta-analysis considered the incidence of a depressive disorder by 6 weeks postpartum as an outcome. While 10 women from the control group were diagnosed with depression (9.3%), only three women (2.7%) were diagnosed in the intervention group. Other studies (*n*=4) reported the percentage of women that scored above cut-off scores for depression, using the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987). The rates varied between 11.8% and 40.6% for the control groups, and, in contrast, between 8.7% to 17.4% for the intervention groups. However, different cut-off scores were used (ranging from 10 to 14), which makes the percentages difficult to compare. To be able to detect whether universal prevention leads to less cases of a depressive disorder (and thus to genuinely assess the effect of universal prevention during pregnancy on the development of psychopathology), future studies are strongly encouraged to report the incidence rate of depression and other mental disorders as an outcome. When cut-off scores are used for this aim, it is important to use comparable cut-off score across studies.

While earlier reviews were not able to quantify the effect of universal prevention on symptoms of *anxiety* (Evans et al., 2018; Sockol, 2018), results of this meta-analysis indicate that, next to depression, universal prevention has a moderately preventing effect on symptoms of anxiety. As an accumulating number of studies indicated that women can experience considerable levels of anxiety symptomatology after childbirth (Glasheen et al., 2010; Field, 2018), even resulting in an anxiety disorder (Dennis et al., 2017), it is an important finding that universal prevention apparently works to alleviate anxiety symptoms. However, the number of interventions focusing on the prevention of anxiety was rather low and the effect size seemed to be smaller (*d*=0.30) than for depression (*d*=0.50) and stress (*d*=0.52). Therefore, in line with earlier meta-analyses (Evans, 2018; Sockol, 2018), we hope that future prevention trials will include anxiety as a target of intervention.

There are two other reviews, which examined effects on general *stress* (Fontein-Kuipers et al. 2014; Taylor et al, 2016). These reviews did not indicate an effect of antenatal universal prevention. However, these reviews included a mixture of universal, selective and indicated prevention, possibly explaining the different results. Also, there were differences in the nature of the stress measures included. In Fontein-Kuipers et al (2014) distress was broadly measured and included symptoms of depression and anxiety next to perception of stress, parenting stress, and parental worry. It is possible that different types of stress need different types of intervention, and that a potential effect of interventions on this broad index of stress would thus be more difficult to detect.

This meta-analysis showed that a minority of interventions focused on both partners. Only in three of the 12 included interventions, the partner was also involved. These interventions focused mainly on the functioning of the couple relationship during the transition to parenthood. Our meta-analysis showed that these interventions were less effective in preventing distress, than interventions that only included the mother. It might be that mothers with a partner willing to participate in a preventive intervention experience higher levels of social support at baseline, and therefore lower levels of distress. The intervention might thus be less effective for this group of women. However, it might be that mothers with a partner willing to participate in a preventive intervention, experience lower levels of distress at baseline, and therefore the intervention might be less effective for this group of women. However, given that both the content of the intervention (focus on the couple relationship), and the target group (couples) varied, no firm conclusion about the effectiveness of including the partner in preventive interventions can be drawn yet. Furthermore, preventing distress in partners might request a different approach, and it is thus worthwhile to also investigate interventions exclusively geared on the partner. Given the paucity of trials that focused on distress of the partner, and abundant research indicating that fathers also experience considerable postpartum distress (Paulson et al., 2016; Matthey et al., 2003) which might also affect the child (Kvalevaag et al., 2013;

Sweeney & Macbeth, 2016), future trials should focus on the prevention of both maternal and paternal distress.

Likewise, we were not able to measure the effectiveness of the interventions on infant outcomes, as only three of the 12 included studies assessed (a variety of) infant outcomes. Beattie et al. (2017) reported no effect on various birth outcomes of their mindfulness intervention. In Feinberg and Kan (2008), parents (especially fathers) participating in a cognitive-behavioural based psychosocial prevention program reported lower levels of dysfunctional interaction and distress in the relationship with their child around 6 months postpartum. Also, infants from the intervention group showed a longer duration of orienting and greater soothability. Abkarzadeh et al., (2016b) reported that in both their intervention groups (psychoeducational attachment and relaxation), the number of counted fetal movements increased compared to the control group.

Given the well-established impact of parental distress on children's well-being and development (Goodman et al., 2011; Murray et al., 2015; Rees et al., 2018), future trials are encouraged to investigate whether the positive effects of the universally applied psychological interventions extend from mother to infant. Since parenting quality is a factor that can be modified by intervention (Stein et al., 2014), focusing on the inclusion of quality-related outcomes, such as soothability and parent-infant interaction (Feinberg & Kan, 2008) could be a promising pathway. For example, including observational measures of parental sensitivity for and responsiveness to stress signals of the infant could be included.

Limitations

The current study has several limitations. First, most of the included studies focused on depressive symptomatology as an outcome. Therefore, we were unable to draw firm conclusions regarding the other indicators of distress, namely symptoms of anxiety and general stress. Second, because none of the included studies focused on child outcomes, no conclusions about the effectiveness of the interventions on infant well-being could be drawn. Third, only a limited number of studies included the partner, which means that the effectiveness of interventions during pregnancy on preventing distress of the partner could not be analyzed. Fourth, the risk of bias assessment indicated that a large part of studies was not sufficiently transparent in reporting all information necessary to give a quality judgement based on the Cochrane Risk of Bias Assessment tool. This was mainly a problem when judging the random sequence generation and the allocation procedure, in which respectively two-third and half of the studies did not report how they handled this. Also, judgement of the incomplete

outcome data criterion revealed that almost half of the studies had to deal with relatively high drop-out rates and/or did not specify the reasons for drop-out adequately. However, subgroup analyses showed no association between overall methodological quality and the size of the effect. Fifth, to be able to detect whether universal prevention would make a difference in preventing distress (i.e. if universal prevention is worthwhile from a cost-effectiveness perspective) we compared the effect of universal prevention to routine care. While routine care can be provided by midwives, there were differences between studies as to which type of routine care women have access to during pregnancy. Also, not all studies provided sufficient details about what constituted regular care in their study. This means that the regular care condition might have varied between studies. To be able to detect if additional support during pregnancy could contribute to stress reduction among pregnant women compared to different types of routine care, future trials are recommended to provide details about regular care in their specific study setting.

Conclusions

This meta-analysis suggests that universally applied psychological interventions during pregnancy are effective in preventing symptoms of maternal distress, at least with regard to depression. While promising, the results with regard to anxiety and stress are based on a considerably lower number of studies, and therefore the effectiveness of universal prevention on the prevention of these types of distress should be interpreted with caution. However, the current meta-analysis offers sufficient indications that, beyond implementing preventive interventions tailored at at-risk women during pregnancy, prenatal services should be offered to all pregnant women, regardless of their risk status. Due to the mix of working elements in the included interventions, it seems too early to conclude what type of intervention should be offered. Importantly, since most studies focused on symptoms of depression, more research is necessary on the effectiveness of universal prevention on symptoms of anxiety and stress. Also, the partner should be included in future trials and, crucially, interventions should be designed and investigated that not only prevent maternal or paternal distress, but also prevent the negative effects of parental distress on the infant.

References

Akbarzadeh, M., & Zare, N. (2016b). Comparative effect of attachment and relaxation training on perception of fetal movement and mother's anxiety in primiparous women: A randomized controlled study. *Trends in Medical Research*, *11*, 62-68. https://doi.org/10.3923/tmr.2016.62.68*

Austin, M.P., Frilingos, M., Lumley, J., Hadzi-Pavlovic, D., Roncolato, W., Acland, S., Saint, K., Segal, N., Parker, G (2008). Brief antenatal cognitive behaviour therapy group intervention for the prevention of postnatal depression and anxiety: A randomised controlled trial. *Journal of Affective Disorders*, *105*, 35-44. https://doi.org/10.1016/j.jad.2007.04.001

Bayrampour, H., Vinturache, A., Hetherington, E., Lorenzetti, D.L., Tough, S. (2018). Risk factors for antenatal anxiety: A systematic review of the literature. *Journal of Reproductive and Infant Psychology*, *36*, 476-503. https://doi.org/10.1080/02646838.2018.1492097

Beattie, J., Hall, H., Biro, M.A., East, C., & Lau, R. (2017). Effects of mindfulness on maternal stress, depressive symptoms and awareness of present moment experience. A pilot randomised trial. *Midwifery*, *50*, 174-183. https://doi.org/10.1016/j.midw.2017.04.006*

Brennan, P. A., Hammen, C., Andersen, M. J., Bor, W., Najman, J. M., & Williams, G. M. (2000). Chronicity, severity, and timing of maternal depressive symptoms: Relationships with child outcomes at age 5. *Developmental Psychology, 36*, 759–766. https://doi.org/10.1037/0012-1649.36.6.759

Bittner, A., Peukert, J., Zimmerman, C., Junge-Hoffmeister, J., Parker, L.S., Stöbel-Richter, Y., & Weidner, K (2014). Early intervention in pregnant women with elevated anxiety and depressive symptoms. Efficacy of a cognitive-behavioural program. *The Journal of Perinatal & Neonatal Nursing*, *28*, 185-195. https://doi.org/10.1097/JPN.0000000000000027

Clatworthy J. (2012). The effectiveness of antenatal interventions to prevent postnatal depression in high-risk women. *Journal of Affective Disorders*, *137*, 25-34. https://doi.org/10.1016/j.jad.2011.02.029

Cohen, J. (1998). Statistical power analysis for the behavioral sciences. Hillsdale, NJ: Erlbaum.

Cox, J.L., Holden, J.M., & Sagovsky, R. (1987). Detection of postnatal depression: development of the 10-item Edinburgh Postnatal Depression Scale. British Journal of Psychology, 150, 782-788.

Daley-McCoy, C., Rogers, M., & Slade, P. (2015). Enhancing relationship functioning during the transition to parenthood: a cluster-randomised controlled trial. *Archives of Women's Health*, *18*, 681-692. https://doi.org/10.1007/s00737-015-0510-7*

Dennis, C., Falah-Hassani, K., & Shiri, R. (2017). Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis. *The British Journal of Psychiatry*, *210*, 315-323. https://doi.org/10.1192/bjp.bp.116.187179

De Wolff, M.S., & Van IJzendoorn, M.H. (1997). Sensitivity and attachment: a meta-analysis on parental antecedents of infant attachment. *Child Development*, *68*, 571-591. https://doi.org/10.1111/j.1467-8624.1997.tb04218.x

Doyle, O., Delaney, L., O'Farrelly, C., Fitzpatrick, N., Daly, M. (2017). Can early intervention improve maternal well-being? Evidence from a randomized controlled trial. *Plos One*, *12*. https://doi.org/10.1371/journal.pone.0169829

Duval, S., & Tweedie, R. (2000). Trim and fill: a simple funnel-plot-based method of testing and adjusting for publication bias in meta-analysis. *Biometrics*, *56*, 455-463. https://doi.org/10.1111/j.0006-341X.2000.00455.x

Evans K, Morrell, C.J., & Spiby, H. (2018). Systematic review and meta-analysis of non-pharmalogical interventions to reduce the symptoms of mild to moderate anxiety in pregnant women. *Journal of Advanced Nursing*, *74*, 289-309. https://doi.org/10.1111/jan.13456

Feinberg, M.E., & Kan, M.L. (2008). Establishing family foundations: Intervention effects on coparenting, parent/infant well-being, and parent-child relations. *Journal of Family Psychology*, *22*, 253-263. https://doi.org/10.1037/0893-3200.22.2.253

Field, T. (2010). Postpartum depression effects on early interactions, parenting, and safety practices: A review. *Infant Behavior and Development*, *33*, 1-6. https://doi.org/10.1016/j.infbeh.2009.10.005

Field, T. (2018). Postnatal anxiety prevalence, predictors, and effects on development: a narrative review. *Infant Behavior and Development*, *51*, 24-32. https://doi.org/10.1016/j.infbeh.2018.02.005.

Fontein-Kuipers, Y.J., Nieuwenhuijze, M.J., Ausems, M., Budé, L., De Vries, R. (2014). Antenatal interventions to reduce maternal distress: A systematic review and meta-analysis of randomised trials. *BJOG*, *121*, 389-397.

Gao L, Chan SW, Li X, Chen S, Hao Y. (2010). Evaluation of an interpersonal-psychotherapy-oriented childbirth education programme for Chinese first-time childbearing women: A randomised controlled trial. *International Journal of Nursing Studies*, *47*, 1208-1216. https://doi.org/10.1016/j.ijnurstu.2010.03.002*

Gavin, N., Gaynes, B.N., Lohr, K., Meltzer-Brody, S., Gartlehner, G., & Swinson, T. (2005). Perinatal depression: A systematic review of prevalence and incidence. *Obstetrics & Gynecology*, *106*, 1071-1083. https://doi.org/doi: 10.1097/01.AOG.0000183597.31630.db

Glasheen C, Richardson GA, Fabio A. (2010). A systematic review of the effects of postnatal maternal anxiety on children. *Archives of Women's Mental Health*, *13*, 61-74. https://doi.org/10.1007/s00737-009-0109-y

Goodman, S.H., Rouse, M.H., Connell, A.M., Robbins Broth, M., Hall, C.M., & Heyward, D. (2011). Maternal depression and child psychopathology: A meta-analytic review. *Clinical Child Family Psychology Review*, *14*, 1-27.

Haga, S.M., Drozd, F., Lisoy, C., Wentzel-Larsen, T., Slining, K. (2019). Mamma Mia – A randomized controlled trial of an internet-based intervention for perinatal depression. *Psychological Medicine*, *49*, 1850-1858. https://doi.org/10.1017/S0033291718002544

Hall, H.G., Beattie, J., Lau, R., East, C., Biro, M.A. (2016). Mindfulness and perinatal mental health: a systematic review. *Women and Birth*, *29*, 62-71. https://doi.org/10.1016/j.wombi.2015.08.006

Henshaw, E.J., Cooper, M.A., Jaramillo, M., Lamp, M.N., Jones, A.L., & Wood, T.L. (2018). "Trying to figure out if you are doing things right, and where to get the info": Parents recall information and support needed

during the first 6 weeks postpartum. *Maternal and Child Health Journal*, *22*, 1668-1675. https://doi.org/10.1007/s10995-018-2565-3

Heron, J., O'Connor, T.G., Evans, J., Golding, J., & Glover, V. (2004). The course of anxiety and depression through pregnancy and the postpartum in a community sample. *Journal of Affective Disorders*, *80*, 65-73. https://doi.org/10.1016/j.jad.2003.08.004

Khorsandi, M., Vakilian, K., Salehi, B., Goudarzi, M.T., & Abdi, M. (2016). The effects of stress inoculation training on perceived stress in pregnant women. *Journal of Health Psychology*, *21*, 2977-2982. https://doi.org/10.1177/1359105315589800*

Kvalevaag A.L., Ramchandani, P.G., Hove, O., Assmus, J., Eberhard-Gran, M., Biringer, E. (2013). Paternal mental health and socioemotional and behavioural development in their children. *Pediatrics*, *131*, 1-7. https://doi.org/10.1542/peds.2012-0804

Landry, S.H., Smith, K.E., & Swank, P.R. (2006). Responsive parenting: Establishing early foundations for social, communication, and independent problem-solving skills. *Developmental Psychology*, *42*, 627-642. https://doi.org/10.1037/0012-1649.42.4.627

Letourneau N. Intergenerational transmission of adverse childhood experiences via maternal depression and anxiety and moderation by child sex. (2019). *Journal of Developmental*
Origins of Health and Disease, *10*, 88–99. https:/doi.org/10.1111/j.1744-6163.2012.00331.x 10.1017/S2040174418000648

Mao, H., Li, H., Chiu, H., Chan, W., & Chen, S. (2012). Effectiveness of antenatal emotional self-management training program in the prevention of postnatal depression in Chinese women. *Perspectives in Psychiatric Care*, *48*, 218-224. https:/doi.org/10.1111/j.1744-6163.2012.00331.x*

Matthey, S., Barnett, B., Howie, P., & Kavanagh, D.J. (2003). Diagnosing postpartum depression in mothers and fathers: whatever happened to anxiety? *Journal of Affective Disorders*, *74*, 139-47. https://doi.org/10.1016/S0165-0327(02)00012-5

Matvienko-Sikar, K., & Dockray, S. (2017). Effects of a novel positive psychology intervention on prenatal stress and well-being: A pilot randomised trial. *Women and Birth*, *30*, 111-118. https://doi.org/10.1016/j.wombi.2016.10.003*

McCoy, S.J., Beal, J.M., Shipman, S.B., Payton, M.E., & Watson, G.H. (2006). Risk factors for postpartum depression: A retrospective investigation at 4-weeks postnatal and a review of the literature. *Journal of the American Osteopathic Association*, *106*, 193-198.

Milgrom, J., Gemmill, A.W., Bilszta, J.L., Hayes, B., Barnett, B., Brooks, J., Ericksen, J., Ellwood, D., & Buist, A (2008). Antenatal risk factors for postnatal depression: A large prospective study. *Journal of Affective Disorders*, *108*, 147-157. https://doi.org/10.1016/j.jad.2007.10.014

Milgrom J, Schembri C, Ericksen J, Ross J, Gemmill AW. (2011).Towards parenthood: An antenatal intervention to reduce depression, anxiety, and parenting difficulties. *Journal of Affective Disorders*, *130*, 385-394.* https://doi.org/10.1016/j.jad.2010.10.045

Missler, M.A., Beijers, R., Denissen, J.J.A., Van Straten, A. (2018). Effectiveness of a psycho-educational intervention to prevent postpartum parental distress and enhance infant well-being: study protocol of a randomized controlled trial. *Trials*, *19*, 4. https://doi.org/10.1186/s13063-017-2348-y

Morris-Rush, J.K., Freda, M., Bernstein, P.S. (2003). Screening for postpartum depression in an inner-city population. *American Journal of Obstetrics and Gynecology*, *188*, 1217-1219. https://doi.org/10.1067/mob.2003.279

Murray, L., Fearon, P., Cooper, P. (2015). Postnatal depression, mother-infant interactions, and child development - prospects for screening and treatment. In J. Milgrom & A. Gemmill (Eds.), *Identifying Perinatal Depression and Anxiety: Evidence-based Practice in Screening, Psychosocial Assessment and Management* (pp. 139-164). Wiley Blackwell: Oxford.

Paulson, J.F., Dauber, S., Leiferman, J.A. (2006). Individual and combined effects of postpartum depression in mothers and fathers on parenting behavior. *Pediatrics*, *118*, 659-668. https://doi.org/10.1542/peds.2005-2948

Ramezani, S., Khosravi, A., Motaghi, Z., Hamidzadeh, A., & Mousavi, S.A. (2017). The effect of cognitive-behavioural and solution-focused counselling on prevention of postpartum depression in nulliparous pregnant women. *Journal of Reproductive and Infant Psychology*, *35*, 172-182. https://doi.org/10.1080/02646838.2016.1266470*

Rees, S., Channon, S., & Waters, C.S. (2018). The impact of maternal prenatal and postnatal anxiety on children's emotional problems: a systematic review. *European Child & Adolescent Psychology, 28*, 257-280. https://doi.org/10.1007/s00787-018-1173-5

Sockol, L.E., Epperson, C.N., Barber, J.P. (2013). Preventing postpartum depression: a meta-analytic review. *Clinical Psychology Review*, *33*, 1205-1217. https://doi.org/10.1016/j.cpr.2013.10.004

Sockol, L.E. (2015). A systematic review of the efficacy of cognitive behavioral therapy for treating and preventing perinatal depression. *Journal of Affective Disorders*, *177*, 7-21. https://doi.org/10.1016/j.jad.2015.01.052

Sockol LE. (2018). A systematic review and meta-analysis of interpersonal psychotherapy for perinatal women. *Journal of Affective Disorders*, *232*, 316-328. https://doi.org/10.1016/j.jad.2018.01.018

Sroufe, A.L. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. 2005: *Attachment & Human Development*, *7*, 349-367.

Stein, A., Craske, M.G., Lehtonen, A., Harvey, A., Savage-McGlynn, E., Davies, B., Goodwin, J., Murray, L., Cortina-Borja, M., & Counsell, N. (2012). Maternal cognitions and mother–infant interaction in postnatal depression and generalized anxiety disorder. *Journal of Abnormal Psychology*, *121*, 795-809. https://doi.org/10.1037/a0026847

Stein, A., Pearson, R.M., Goodman, S.H., Rapa, E., Rahman, A., McCallum, M., Howard, L.M., & Pariante, C.M. (2014). Effects of perinatal mental disorders on the fetus and child. *The Lancet*, *384*, 1800-1819. https://doi.org/10.1016/S0140-6736(14)61277-0

Sweeney S, MacBeth A. (2016). The effects of paternal depression on child and adolescent outcomes: A systematic review. *Journal of Affective Disorders*, *205*, 44-59. https://doi.org/10.1016/j.jad.2016.05.073

Taylor, B.L., Cavanagh, K., & Strauss, C (2016). The effectiveness of mindfulness-based interventions in the perinatal period: A systematic review and meta-analysis. *Plos One*, *11*. https://doi.org/10.1371/journal.pone.0155720

US Preventive Services Task Force. Interventions to prevent perinatal depression: US Preventive Task Force recommendation statement. (2019). *JAMA*, *321*, 580-587. https://doi.org/10.1001/jama.2019.0007

Van Scheppingen, M. A., Denissen, J. J. A., Chung, J. M., Tambs, K., & Bleidorn, W. (2018). Self-esteem and relationship satisfaction during the transition to motherhood. *Journal of Personality and Social Psychology, 114*, 973–991. https://doi.org/10.1037/pspp0000156

Woolhouse, H., Mercuri, K., Judd, F., & Brown, S.J. (2014). Antenatal mindfulness intervention to reduce depression, anxiety, and stress: a pilot randomised controlled trial of the *MindBabyBody* program in an Australian tertiary maternity hospital. *BMC Pregnancy and Childbirth*, *14*, 369. https://doi.org/10.1186/s12884-014-0369-z*

Yelland, J., Sutherland, G., Brown, S.J. (2010). Postpartum anxiety, depression and social health: findings from a population-based survey of Australian women. *BMC Public Health*, *10*, 771. https://doi.org/10.1186/1471-2458-10-771

Zlotnick, C., Miller, I.W., Pearlstein, T., Howard, M., & Sweeney, P. (2006). A preventive intervention for pregnant women on public assistance at risk for postpartum depression. *American Journal of Psychiatry*, *163*, 1443-1445. https://doi.org/10.1176/appi.ajp.163.8.1443

Zlotnick TC, Tzilos G, Miller I, Seifer R, Stout R. Randomized controlled trial to prevent postpartum depression in mothers on public assistance. 2016; J Aff Dis: 189, 263-268. http://dx.doi.org/10.1016/j.jad.2015.09.059

Appendix

PubMed Session Results (15 Nov 2018)

#	Query	Results
#5	#1 AND #2 AND #3 AND #4	2,148
#4	randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized[tiab] OR randomised[tiab] OR placebo[tiab] OR drug therapy[sh] OR randomly[tiab] OR trial[tiab] OR groups[tiab]	4,392,989
#3	"Stress, Psychological"[Mesh] OR "Anxiety"[Mesh:NoExp] OR "Depression"[Mesh] OR "Depressive Disorder"[Mesh:NoExp] OR "Depression, Postpartum"[Mesh] OR maternal distress[tiab] OR maternal stress[tiab] OR parenting distress[tiab] OR parenting stress[tiab] OR parental distress[tiab] OR parental stress[tiab] OR psychological distress[tiab] OR psychological stress[tiab] OR parental well-being[tiab] OR infant well-being[tiab] OR parental wellbeing[tiab] OR infant wellbeing[tiab] OR infant development[tiab] OR infant crying[tiab] OR infant sleeping[tiab] OR "Infant Health"[Mesh] OR infant health[tiab] OR baby health[tiab] OR newborn health[tiab] OR neonate health[tiab] OR neonatal health[tiab]	336,914
#2	"Early Intervention (Education)"[Mesh] OR "Education"[Mesh] OR "Social Support"[Mesh] OR "Cognitive Therapy"[Mesh] OR "Preventive Health Services"[Mesh:NoExp] OR "Primary Prevention"[Mesh] OR "Health Education"[Mesh] OR "Health Promotion"[Mesh] OR early intervention*[tiab] OR social support[tiab] OR social network*[tiab] OR cognitive therap*[tiab] OR cognitive psychotherap*[tiab] OR primary prevention[tiab] OR health education[tiab] OR health promotion[tiab]	1,042,708
#1	"Parents"[Mesh] OR "Pregnant Women"[Mesh] OR "Pregnancy"[Mesh] OR "Maternal Health Services"[Mesh] OR parent[tiab] OR parents[tiab] OR parental[tiab] OR father*[tiab] OR mother*[tiab] OR pregnan*[tiab] OR gravidit*[tiab] OR gestation*[tiab] OR placentat*[tiab] OR prepregnan*[tiab] OR conception*[tiab] OR preconception*[tiab] OR perinatal[tiab] OR prenatal[tiab]	1,458,107

Embase.com Session Results (15 Nov 2018)

#	Query	Results
#5	#1 AND #2 AND #3 AND #4	2,795
#4	random* OR factorial* OR crossover* OR cross NEXT/1 over* OR placebo* OR (doubl* AND blind*) OR (singl* AND blind*) OR assign* OR allocat* OR	2,314,538

	volunteer* OR 'crossover procedure'/exp OR 'double blind procedure'/exp OR 'randomized controlled trial'/exp OR 'single blind procedure'/exp	
#3	'mental stress'/exp OR 'anxiety'/de OR 'depression'/de OR 'puerperal depression'/exp OR 'child health'/exp OR 'maternal distress':ab,ti,kw OR 'maternal stress':ab,ti,kw OR 'parenting distress':ab,ti,kw OR 'parenting stress':ab,ti,kw OR 'parental distress':ab,ti,kw OR 'parental stress':ab,ti,kw OR 'psychological distress':ab,ti,kw OR 'psychological stress':ab,ti,kw OR 'parental well-being':ab,ti,kw OR 'infant well-being':ab,ti,kw OR 'parental wellbeing':ab,ti,kw OR 'infant wellbeing':ab,ti,kw OR 'infant development':ab,ti,kw OR 'infant crying':ab,ti,kw OR 'infant sleeping':ab,ti,kw OR 'infant health':ab,ti,kw OR 'baby health':ab,ti,kw OR 'newborn health':ab,ti,kw OR 'neonate health':ab,ti,kw OR 'neonatal health':ab,ti,kw	576,190
#2	'early childhood intervention'/exp OR 'education'/exp OR 'social support'/exp OR 'cognitive therapy'/exp OR 'cognitive behavioral therapy'/exp OR 'preventive health service'/de OR 'primary prevention'/exp OR 'health education'/exp OR 'early intervention*':ab,ti,kw OR 'social support':ab,ti,kw OR 'social network*':ab,ti,kw OR 'cognitive therap*':ab,ti,kw OR 'cognitive psychotherap*':ab,ti,kw OR 'primary prevention':ab,ti,kw OR 'health education':ab,ti,kw OR 'health promotion':ab,ti,kw	1,577,450
#1	'parent'/exp OR 'pregnant woman'/exp OR 'pregnancy'/exp OR 'maternal health service'/exp OR parent:ab,ti,kw OR parents:ab,ti,kw OR parental:ab,ti,kw OR father*:ab,ti,kw OR mother*:ab,ti,kw OR pregnan*:ab,ti,kw OR gravidit*:ab,ti,kw OR gestation*:ab,ti,kw OR placentat*:ab,ti,kw OR prepregnan*:ab,ti,kw OR conception*:ab,ti,kw OR preconception*:ab,ti,kw OR perinatal:ab,ti,kw OR prenatal:ab,ti,kw	1,638,562

Ebsco / PsycINFO Session Results (15 Nov 2018)

#	Query	Results
S5	S1 AND S2 AND S3 AND S4	591
S4	DE "Treatment Effectiveness Evaluation" OR DE "Clinical Trials" OR DE "Mental Health Program Evaluation" OR DE "Placebo" OR TI placebo* OR AB placebo* OR AB randomly OR TX randomi* OR TI trial OR AB trial OR TX ((singl* OR doubl* OR trebl* OR tripl*) N3 (blind* OR mask* OR dummy)) OR TI (control* N3 (trial* OR study OR studies OR group*)) OR AB (control* N3 (trial* OR study OR studies OR group*)) OR TI factorial* OR AB factorial* OR TI allocat* OR AB allocat* OR TI assign* OR AB assign* OR TI volunteer* OR AB volunteer* OR TI (crossover* OR "cross over*") OR AB (crossover* OR "cross over*") OR TX (quasi N5 (experimental OR random*))	485,125
S3	DE "Psychological Stress" OR DE "Anxiety" OR DE "Depression (Emotion)" OR DE "Major Depression" OR DE "Postpartum Depression OR TI ("maternal	202,014

	distress" OR "maternal stress" OR "parenting distress" OR "parenting stress" OR "parental distress" OR "parental stress" OR "psychological distress" OR "psychological stress" OR "parental well-being" OR "infant well-being" OR "parental wellbeing" OR "infant wellbeing" OR "infant development" OR "infant crying" OR "infant sleeping" OR "infant health" OR "baby health" OR "newborn health" OR "neonate health" OR "neonatal health") OR AB ("maternal distress" OR "maternal stress" OR "parenting distress" OR "parenting stress" OR "parental distress" OR "parental stress" OR "psychological distress" OR "psychological stress" OR "parental well-being" OR "infant well-being" OR "parental wellbeing" OR "infant wellbeing" OR "infant development" OR "infant crying" OR "infant sleeping" OR "infant health" OR "baby health" OR "newborn health" OR "neonate health" OR "neonatal health") OR KW ("maternal distress" OR "maternal stress" OR "parenting distress" OR "parenting stress" OR "parental distress" OR "parental stress" OR "psychological distress" OR "psychological stress" OR "parental well-being" OR "infant well-being" OR "parental wellbeing" OR "infant wellbeing" OR "infant development" OR "infant crying" OR "infant sleeping" OR "infant health" OR "baby health" OR "newborn health" OR "neonate health" OR "neonatal health")	
S2	DE "Early Intervention" OR DE "Education" OR DE "Family Life Education" OR DE "Parent Training" OR DE "Social Support" OR DE "Cognitive Therapy" OR DE "Cognitive Behavior Therapy" OR DE "Primary Mental Health Prevention" OR DE "Health Education" OR DE "Health Promotion" OR TI ("early intervention*" OR "social support" OR "social network*" OR "cognitive therap*" OR "cognitive psychotherap*" OR "primary prevention" OR "health education" OR "health promotion") OR AB ("early intervention*" OR "social support" OR "social network*" OR "cognitive therap*" OR "cognitive psychotherap*" OR "primary prevention" OR "health education" OR "health promotion") OR KW ("early intervention*" OR "social support" OR "social network*" OR "cognitive therap*" OR "cognitive psychotherap*" OR "primary prevention" OR "health education" OR "health promotion")	237,788
S1	DE "Parents" OR DE "Fathers" OR DE "Mothers" OR DE "Expectant Mothers" OR DE "Pregnancy" OR DE "Adolescent Pregnancy" OR TI (parent OR parents OR parental OR father* OR mother* OR pregnan* OR gravidit* OR gestation* OR placentat* OR prepregnan* OR conception* OR preconception* OR perinatal OR prenatal) OR AB (parent OR parents OR parental OR father* OR mother* OR pregnan* OR gravidit* OR gestation* OR placentat* OR prepregnan* OR conception* OR preconception* OR perinatal OR prenatal) OR KW (parent OR parents OR parental OR father* OR mother* OR pregnan* OR gravidit* OR gestation* OR placentat* OR prepregnan* OR conception* OR preconception* OR perinatal OR prenatal)	419,806

Ebsco / CINAHL Session Results (15 Nov 2018)

#	Query	Results
S5	S1 AND S2 AND S3 AND S4	815
S4	(MH "Clinical Trials+") OR (PT Clinical trial) OR (TX clini* N1 trial*) OR (TX ((singl* N1 blind*) or (singl* N1 mask*)) or TX ((doubl* N1 blind*) or (doubl* N1 mask*)) OR or TX ((tripl* N1 blind*) or (tripl* N1 mask*))) OR (TX randomi* control*) OR (MH "Random Assignment") OR ((TX random* allocat*) or (TX allocat* random*)) OR (TX placebo*) OR (TX (waitlist* or (wait* and list*)) and (control* or group))) OR ((TX "treatment as usual") or (TX tau)) OR (TX (control* N3 (trial* or study or studies or group*))) OR (MH "Quantitative Studies")	552,344
S3	(MH "Stress, Psychological+") OR (MH "Anxiety") OR (MH "Depression") OR (MH "Depression, Postpartum") OR (MH "Child Health") OR TI ("maternal distress" OR "maternal stress" OR "parenting distress" OR "parenting stress" OR "parental distress" OR "parental stress" OR "psychological distress" OR "psychological stress" OR "parental well-being" OR "infant well-being" OR "parental wellbeing" OR "infant wellbeing" OR "infant development" OR "infant crying" OR "infant sleeping" OR "infant health" OR "baby health" OR "newborn health" OR "neonate health" OR "neonatal health") OR AB ("maternal distress" OR "maternal stress" OR "parenting distress" OR "parenting stress" OR "parental distress" OR "parental stress" OR "psychological distress" OR "psychological stress" OR "parental well-being" OR "infant well-being" OR "parental wellbeing" OR "infant wellbeing" OR "infant development" OR "infant crying" OR "infant sleeping" OR "infant health" OR "baby health" OR "newborn health" OR "neonate health" OR "neonatal health") OR KW ("maternal distress" OR "maternal stress" OR "parenting distress" OR "parenting stress" OR "parental distress" OR "parental stress" OR "psychological distress" OR "psychological stress" OR "parental well-being" OR "infant well-being" OR "parental wellbeing" OR "infant wellbeing" OR "infant development" OR "infant crying" OR "infant sleeping" OR "infant health" OR "baby health" OR "newborn health" OR "neonate health" OR "neonatal health")	188,935
S2	(MH "Early Childhood Intervention") OR (MH "Education") OR (MH "Support, Psychosocial") OR (MH "Cognitive Therapy") OR (MH "Health Education") OR (MH "Health Promotion") OR TI ("early intervention*" OR "social support" OR "social network*" OR "cognitive therap*" OR "cognitive psychotherap*" OR "primary prevention" OR "health education" OR "health promotion") OR AB ("early intervention*" OR "social support" OR "social network*" OR "cognitive therap*" OR "cognitive psychotherap*" OR "primary prevention" OR "health education" OR "health promotion") OR KW ("early intervention*" OR "social support" OR "social network*" OR "cognitive therap*" OR "cognitive psychotherap*" OR "primary prevention" OR "health education" OR "health promotion")	195,286

S1	(MH "Parents") OR (MH "Fathers") OR (MH "Mothers") OR (MH "Expectant Mothers") OR (MH "Pregnancy+") OR TI (parent OR parents OR parental OR father* OR mother* OR pregnan* OR gravidit* OR gestation* OR placentat* OR prepregnan* OR conception* OR preconception* OR perinatal OR prenatal) OR AB (parent OR parents OR parental OR father* OR mother* OR pregnan* OR gravidit* OR gestation* OR placentat* OR prepregnan* OR conception* OR preconception* OR perinatal OR prenatal) OR KW (parent OR parents OR parental OR father* OR mother* OR pregnan* OR gravidit* OR gestation* OR placentat* OR prepregnan* OR conception* OR preconception* OR perinatal OR prenatal)	359,970

Wiley / Cochrane Library Session Results (15 Nov 2018)

#	Query	Results
#4	#1 AND #2 AND #3	371
#3	("maternal distress" OR "maternal stress" OR "parenting distress" OR "parenting stress" OR "parental distress" OR "parental stress" OR "psychological distress" OR "psychological stress" OR "parental well-being" OR "infant well-being" OR "parental wellbeing" OR "infant wellbeing" OR "infant development" OR "infant crying" OR "infant sleeping" OR "infant health" OR "baby health" OR "newborn health" OR "neonate health" OR "neonatal health"):ab,ti,kw	4,570
#2	((early NEXT intervention*) OR "social support" OR (social NEXT network*) OR (cognitive NEXT therap*) OR (cognitive NEXT psychotherap*) OR "primary prevention" OR "health education" OR "health promotion"):ab,ti,kw	33,845
#1	(parent OR parents OR parental OR father* OR mother* OR pregnan* OR gravidit* OR gestation* OR placentat* OR prepregnan* OR conception* OR preconception* OR perinatal OR prenatal):ab,ti,kw	70,948

5

Effectiveness of a psycho-educational intervention to prevent postpartum parental distress and enhance infant well-being: study protocol of a randomized controlled trial

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Abstract

Background The first months after birth can be challenging for parents, leading to parental distress and decreased well-being. Parents with high levels of distress are found to respond less adequately and sensitively to their infant, which in turn affects infant well-being and health. The goal of this study is to examine the effectiveness of a psycho-educational intervention to prevent postpartum parental distress and enhance quality of caregiving and infant well-being. In contrast to other interventions, this intervention will be (1) offered already before birth (2) offered to all parents-to-be, regardless of their risk of postpartum distress, and (3) including fathers. The proposed study examines the effectiveness of this intervention on (1) parenting distress (2) quality of caregiving, and (3) the infant's well-being.

Methods In this randomized controlled trial, 128 pregnant women and their partners will be recruited through midwife practices and general media. Women with a complicated pregnancy, current psychopathology, insufficient Dutch language proficiency and without internet access will be excluded. Parents will be randomized to either the intervention or a waitlist control group. The intervention consists of a booklet and video (offered prenatally), a home visit at 34-36 weeks of pregnancy and a phone call 4 weeks after birth. Information and practical tools are provided on (1) sensitive responding and making contact with the baby (2) crying (3) feeding and (4) sleeping. Assessments will take place at baseline (26-34 weeks of pregnancy), during the home visit (34-36 weeks of pregnancy), and 2, 6 and 10 weeks after birth. The control group will be offered the intervention after the end of the study. The primary outcome is maternal parenting stress. Secondary outcomes are: paternal parenting stress, parental well-being, quality of caregiving, and infant well-being and health.

Discussion The goal of this study is to test the effects of a psycho-educational prenatal parenting intervention to prevent postpartum parental distress and to enhance well-being in both parents and infants. When the intervention appears effective it can be implemented broadly because of its low costs. It will make support available for a large number of parents and their children.

Trial registration Netherlands National Trial Register NTR6065, 15 September 2016

Key words Parents; pregnant women; stress; early intervention; prevention; infant health

Background

Having a baby is an intense experience that turns the world of new parents upside down. While this life event often brings joy and happiness, the first months can also be challenging for parents (van Scheppingen, Denissen, Chung, Tambs, & Bleidorn, 2018). Parents have to develop a range of new skills in taking care for their infant, which requires extra effort and energy, while at the same time they have to deal with a significant lack of sleep. It is not surprising therefore, that roughly 14 % of mothers and 10 % of fathers experience moderate or severe levels of postpartum distress (Paulson, Dauber, & Leiferman, 2006), mainly consisting of depressive symptoms (e.g. O'Hara & McCabe, 2013). This study examines the effectiveness of a psycho-educational intervention to prevent postpartum parental distress and enhance infant well-being.

Parental distress and sensitive responding to the infant's needs

Parental distress (including, but not limited to, stress related to the parental role) has been related to decreased quality of caregiving. Both maternal (Brennan, Hammen, Andersen, Bor, Najman, & Williams, 2000; Gelfand & Teti, 1990) as well as paternal depression (Ramchandani, 2005) have been associated with a range of negative outcomes for the child's emotional, cognitive and behavioural development (Downey & Coyne, 1990). The supposed mechanism underlying this link is that depressed parents are less able to respond sensitively to their infant (Gelfand & Teti, 1990; Lovejoy, Graczyk, O'Hare, & Neuman, 2000). Sensitivity refers to the extent to which caregivers timeously and appropriately respond to the infant's needs and signals (Ainsworth et al., 1978). Caregiver sensitivity has been identified as one of the most robust predictors of the development of a secure attachment bond between parent and child (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2003; De Wolff & Van IJzendoorn, 1997; Isabella, Belsky, & Von Eye, 1989; Tharner et al., 2012). Moreover, sensitivity has also been associated with increased social competence, resilience, regulatory capacities and lower stress levels later in life (Groh, Roisman, Van IJzendoorn, Bakermans-Kranenburg & Fearon, 2012; Fearon, Bakermans-Kranenburg, Van IJzendoorn, Lapsley, & Roisman, 2010; Smeekens, Riksen-Walraven, & Van Bakel, 2007; Sroufe, 2005).

Other important characteristics of caregiving behaviour are the type of feeding and the infant sleeping location that parents have arranged. Current Dutch guidelines advise parents to exclusively breastfeed for 6 months, and to share their room with the infant for 6 months (infant sleeping in its own crib in the parents' room, but not in the parental bed) (TNO, 2011;2015). The World Health Organization (WHO) also recommends exclusive breastfeeding until the infant is 6 months of age (WHO, 2017). Breastfeeding has been related to important health benefits for the child, including protection against of infections, overweight, and diabetes (Horta & Victora, 2013; Victora et al., 2016). Moreover, breastfeeding has been related to increased cognitive development (Horta, Loret de Mola, & Victora, 2015). Next to breastfeeding, there is international agreement on the benefits of room-sharing during the first 6 months of the infant's life. Room-sharing protects from sudden infant death syndrome (SIDS; Rollins, 2017). Also, being close to the infant facilitates the process of breastfeeding at night (Ball, 2003; Ball, Ward-Platt, Heslop, Leech, & Brown, 2006). There are indications that the proximity of the parent functions as a buffer against the infant's distress (Tollenaar et al., 2012; Beijers, Riksen-Walraven, & De Weerth, 2013). Despite these recommendations, it has been demonstrated that both breastfeeding and room-sharing are frequently discontinued in the first two months of the infant's life (TNO, 2011; 2015).

Interventions to reduce parental distress

There are a number of interventions available that have been proven effective in reducing parental distress (Bakermans-Kranenburg, Van IJzendoorn, & Juffer 2003; Guttentag et al., 2014; Klein Velderman, Bakermans-Kranenburg, Juffer, & Van IJzendoorn, 2006; Landry et al., 2006; Van Doesum et al., 2008). These interventions mostly start during the postpartum period and are tailored at families from high-risk populations, such as families with low socioeconomic status (SES), parents of an infant born prematurely, foster parents, and parents from children at risk for developing autism spectrum disorder. Moreover, these previous interventions mostly focused on only the mother. This is remarkable, because research showed that the father can play an important role, for example in supporting the mother with breastfeeding and prolonging the breastfeeding period (Pisacane, Continisio, Aldinucci, D'Amora, & Continisio, 2005; Maycock et al., 2013). Also, intervention studies aimed at treating depression of the mother showed that inclusion of the father in treatment led to greater successes of the treatment (Tambelli et al., 2015). Support of the father might protect against

maternal stress and the development of postpartum depression, and mitigate the negative effects of depression on mother-infant interaction (Van Doesum et al., 2008). Furthermore, it has also been found that fathers tend to decrease their involvement in childcare when they suffer from psychological adjustment difficulties around the transition to parenthood (Jia, Kotila, Schoppe-Sullivan, & Kamp Dush, 2016). Thus, previous research pointed to the importance of including fathers in the intervention, as this might have positive effects on the well-being of both parents as well as on the quality of their caregiving.

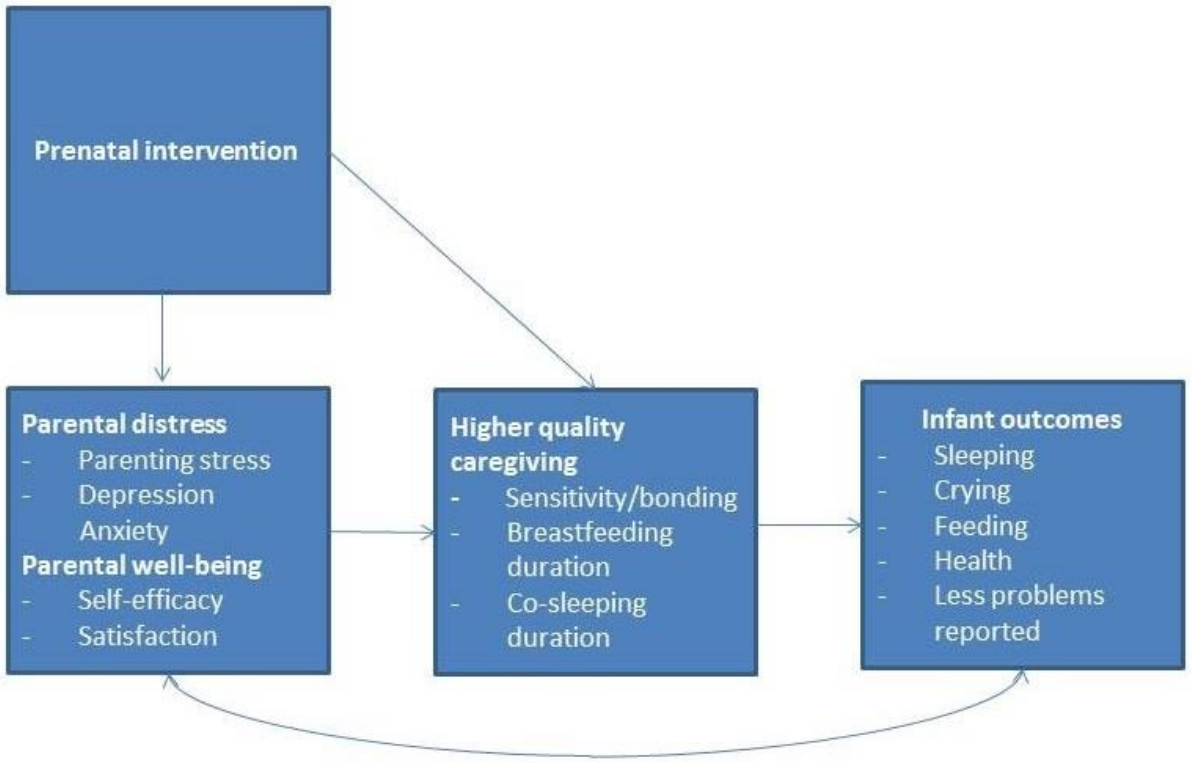
To our knowledge, there is only one intervention up to date that focused on parents from both low- and high-risk groups. This intervention consists of psychoeducation about infant sleep and crying patterns, in combination with a telephone consult and a parent group, and showed positive results in a randomised controlled trial (Hiscock et al, 2014). However, the intervention did not include information on sensitivity or feeding, and it was offered postpartum. Furthermore, as only data of the primary caregiver was collected, almost only data from the mother was available as a result.

The current study

We developed an intervention which can be offered during pregnancy, to both mothers and fathers, regardless of their risk of postpartum distress. The intervention consists of psycho-education (booklet and video) as well as a prenatal home visit and a postpartum phone call.

We expect that the proposed intervention reduces parenting stress of the mother. Furthermore, we expect that the intervention reduces parenting stress of the father and parental distress in general. Moreover, we expect that parental well-being will be enhanced. By psychoeducating parents during pregnancy, we expect parents to experience more self-efficacy and satisfaction in fulfilling their role. In this way, parents should be better able to provide high quality caregiving (including breastfeeding and room-sharing), leading to enhanced infant well-being (less problems with sleeping, crying and feeding, and better well-being and health) (Figure 1).

Figure 1. *Primary and secondary study outcomes.*



Objectives

The primary objective of this study is to determine the postpartum effect of the intervention on maternal parenting stress. Secondary outcomes are: paternal parenting stress, parental distress in general (anxiety and depression) and parental well-being (satisfaction with the parental role, and self-efficacy in caring for the infant); quality of caregiving (bonding, breastfeeding, and room-sharing); and infant well-being and health (crying, feeding, sleeping, well-being, and health).

Methods/Design

Trial Design

The study is a randomized controlled trial with two parallel groups: an intervention and a waitlist control group. The waitlist group will receive the intervention after the last assessment (10 weeks after the birth of their infant, see Figure 2).

Study setting and recruitment

Women will be recruited either through midwife practices or general media (newspaper ads and Internet banners). The midwives will give the parents-to-be a flyer, referring to the study's website. Alternatively, parents can contact us directly by responding to online advertisements in which a link to the website is provided. On the website, a registration form can be filled out. Upon registering, parents will receive the digital information brochure of the study and an informed consent form. Following the Declaration of Helsinki, it will be clearly indicated on the informed consent form that study participation is entirely voluntary and that participants can withdraw from participation at any time without any negative consequences for them or their child. If parents decide to take part in the study, they will be asked to return the informed consent form. Interested parents who are not eligible for inclusion will receive a message explaining the reason(s) why they are excluded.

In- and exclusion criteria

Pregnant women will be included in the study when they are before the 34th week of pregnancy and do not have severe medical conditions due to pregnancy (i.e. gestational diabetes or pre-eclampsia). Furthermore, women need sufficient Dutch language proficiency to understand the information offered to them during the intervention (through a booklet and a video). Also, access to the internet is required to be able to complete the online questionnaires. Women with current psychopathology (defined as current treatment for psychopathology or treatment in the 6 months before inclusion) will be excluded.

The partners of the pregnant women will also be asked to participate. However, women without a partner, or women with a partner who does not want to participate, can also enter the study.

Sample size calculation

We expect an effect size of 0.50 (Cohen's d). This is based on the work of Hiscock et al. (2014). Their intervention, aimed at preventing infant sleep and crying problems, showed an odds ratio of 0.57 (converted into a Cohen's *d* of 0.48) on symptoms of maternal depression in favour of the intervention group. Using a power of 80%, an alpha of 0.05, we need to include 64 participants in both conditions, 128 in total, to answer our primary research question.

Randomization

An independent researcher will generate random number sequences using random allocation software with a 1:1 ratio. We will use random sequence blocks (blocks between 6 and 8), stratified by birth order (first/second child) and participation of the father (yes/no). An independent researcher will allocate each consenting participant to either the control or the intervention group. Given the nature and design of the study, blinding after randomization is not possible. Participants will receive the outcome of randomization by e-mail.

Intervention

Parents will receive access to the psycho-education materials (booklet and video) directly after randomisation, which is between the 26th and the 34th week of pregnancy (depending on when the parents apply for participation). The intervention further consists of two support sessions: one home visit between 34-36 weeks of pregnancy and one telephone call 4 weeks after birth.

Figure 2. *Trial design and outcome assessments.*

	Enrolment	Baseline (t0)	Prenatal follow-up	Postnatal follow-up			
TIMEPOINT	1-34 weeks of pregnancy (t-1)	26-34 weeks of pregnancy (t0)	34-36 weeks of pregnancy (t1)	2 weeks after birth (t2)	4 weeks after birth	6 weeks after birth (t3)	10 weeks after birth (t4)
ENROLMENT:							
Eligibility screen		X					
Informed consent	X						
Randomization		X					
INTERVENTIONS:							
Intervention			X		X		
Control							
ASSESSMENTS:							
Demographics		X					
Attachment style		X					
Marital satisfaction		X					X
Parenting distress Parental well-being		X	X			X	X
Quality of caregiving						X	X
Infant well-being						X	X
Delivery characteristics				X			

After screening for eligibility, participants are asked to sign an informed consent form and to complete the baseline questionnaire. Then, participants are randomized in either the intervention or the control group. The intervention starts with a home visit (at t1) and a postnatal phone call (4 weeks after birth). Measurements take place at 26-34 weeks of pregnancy (baseline;t0); 34-36 weeks of pregnancy (t1); 2 weeks after birth (t2; delivery characteristics); 6 weeks after birth (t3); and 10 weeks after birth (t4).

Psycho-educational booklet and video

In general, the intervention conveys the importance of responding sensitively to the needs of the infant. The psycho-educational booklet developed by Hiscock and colleagues (2014) was used as a starting point. We developed and extended the intervention further based on recent empirical research and together with a number of different experts on attachment (researchers), breastfeeding (lactation consultants), and pre- and postnatal care for both mother and child (midwives). Our booklet consists of four chapters about: (1) sensitive responding and making contact with the baby (2) crying; (3) feeding; and (4) sleeping. The first chapter includes information about contact-seeking behaviour of the baby and how to interpret infant's signals of distress and respond to these adequately (e.g. Beijers, Cillessen, & Zijlmans, 2016). The chapter also includes information explaining the needs of the infant (such as the need for closeness, skin-to-skin contact and sensitive care), followed by a discussion about the parent's own needs and how to attend to these. Then, the booklet continues with a chapter about crying. The normal crying curve is addressed, and different tools are provided on how to sooth a baby. Also, potential causes of excessive crying are discussed. The third chapter about feeding includes information about hunger signals the baby might convey. Information is given on breastfeeding, and its positive effects for both mother and child. Practical information about the use of formula milk is also provided. The fourth and final chapter on sleeping provides information on average sleeping patterns and sleep signals a tired baby might convey. Moreover, the importance of room-sharing during the first 6 months will be discussed and suggestions on when and how to support the infant in learning to sleep alone in a separate room are given. It is also important to note here that sensitive care is put central in our intervention, and that for example 'crying it out' and 'camping it out' techniques (Kempler, Sharpe, Miller, & Bartlett, 2016), in which parents are instructed to let infants cry for a specified amount of time, are not included in our intervention. The booklets ends with a section about common baby myths, such as 'Keeping the baby awake all day, will make him/her sleep better during the night' or 'When I pick up my baby every time, I will spoil him/her'. The booklet consists of written text, and pictures. Most importantly, the booklet provides many examples on how to use the information in daily life. In the booklet, it is explained that the provided information is not meant to be prescriptive, rather, it encourages parents to distillate those elements that are most helpful for them in their specific situation (while keeping the principles of sensitive care in their mind). This way, parents can start discovering which tools fit best with their and their infant's preferences and needs.

At the same time as the booklet, participants receive access to an online video. This video is developed by psychologists who are experts in promoting mental health of baby's and their parents by translating academic knowledge into easy accessible interventions (Stichting Babywerk, the Netherlands). The video serves as an illustration of the topics which are described in the booklet and shows practical examples. It is a story format in which the experiences of (upcoming) parents are showed. An expert on infant development comments on each of the fragments. Also, after each fragment, participants are confronted with a thought-provoking question about what they just have seen. The aim of these questions is to stimulate participants to think about the information in relation to their lives. For example, in the story, the upcoming mother is worried that she will be unable to put her mobile phone away when her baby is awake. At this point, the participant will be asked what his or her thoughts are about this issue. Next, the expert explains why being able to recognize and respond to the infant's signals is important. After the explanation, the video shows how to notice and respond to an infant seeking eye contact. Watching the video and responding to the questions takes about 15-20 minutes. The parents are stimulated to put this advice into practice after the birth of their child.

Support sessions

Parents will be visited at home during week 34-36 of the pregnancy. The primary aim of this home visit is to discuss the provided information (booklet and video) and to answer any questions about the materials the parents might have. The secondary aim is to explain that the provided information is not meant to be prescriptive, rather, we aim to provide parents with a set of tools (the practical examples) where they can choose from. By means of provided materials, we ask participants to start discovering which tools fit best most with their and their infant preferences and needs.

Four weeks after the birth of their child, parents will be contacted by phone. During this call, we will ask the parents how they and their child are doing, and whether they are experiencing any problems in implementing the information from the booklet and the video in their daily lives. Also, parents are given the opportunity to ask questions with regard to their infant's feeding, crying, sleeping and contact seeking behaviour. They can also ask questions with regard to their own well-being (i.e. experienced

stress or feelings of anxiety). Both the home visit as well as the phone call will be performed by the corresponding author, who has a background in clinical psychology and infant development.

Wait-list control group and care-as-usual

Parents in the waitlist-control group will receive the same materials as the parents in the intervention group after the last assessment (10 weeks after birth). The information can still be of use for them at that time. Both groups, the intervention and control group, will have access to care-as-usual during the postpartum period. In the Netherlands, this consists of regular consults with a specialized nurse at home (2 weeks after birth) or at the well-baby clinic (at 4, 8, and 12 weeks after birth) during which the health of the infant is checked upon and the infant's growth is followed.

Assessments and outcomes

We will measure at baseline (26-34 weeks of pregnancy, t0); 34-36 weeks of pregnancy (t1); 2 weeks after birth (t2); 6 weeks after birth (t3); and 10 weeks after birth (t4). All assessments will take place online, except for the completion of the infant behaviour diary (t3; Figure 2).

Baseline variables

At baseline (t0), we assess the demographic characteristics of the parents (date of birth; marital status, income, educational level, and working hours).

Furthermore, to control for possible insecure attachment styles of the parents (which can have an impact on their caregiving quality (e.g. Edelstein et al., 2007)), we will measure attachment styles of the parents using the short form of the Experiences in Close Relationships Questionnaire (ECR- short form; Lafontaine, Brassard, Lussier, Valois, Shaver, & Johnson, 2016; Conradi, Gerlsma, Van Duijn, & De Jonge, 2006[1]). The 12 items of this instrument are derived from the avoidance and anxious attachment

[1] Items of the ECR-short form are extracted from the ECR-R (Brennan, Clark, & Shaver, 1998), and this version has been validated in Dutch (Conradi, Gerlsma, Van Duijn, & De Jonge, 2006).

subscales of the ECR-R (6 items of each subscale; Brennan, Clark, & Shaver, 1998). Response options vary from 1 (Strongly disagree) to 7 (Strongly agree). The avoidance subscale measures the need to stay independent from others and to avoid intimacy (Lafontaine et al., 2015, see also Bartholomew & Horowitz, 1991). The anxiety subscale is concerned with the degree to which the subject worries about rejection and abandonment (Lafontaine et al., 2015: Bartholomew & Horowitz, 1991). Following recoding of items 15, 25, 27, 29, and 31; for each subscale (anxiety and avoidance) an average score between 1 and 7 can be computed. Higher scores reflect more attachment anxiety and avoidance. The ECR-short form showed good psychometric properties in different samples: Lafontaine et al. (2015) reported Cronbach's alpha's of .78 to .87 for the anxiety subscale and .74 to .83 for the avoidance subscale.

Primary outcome

The primary outcome is maternal parenting stress (assessed at t0; t1; t3; and t4) and is measured with 10 items of the Dutch version of the Parenting Stress Index (PSI; De Brock, Vermulst, Gerris, & Abidin, 1992a; Abidin, 1983). The complete version of this instrument consists of 123 items. A shortened version of 25 items is available (De Brock, Vermulst, Gerris, & Abidin, 1992b). However, since the PSI has been originally developed for parents of children up to 14 years (De Brock et al., 1992a), our aim was to select the 10 items that are most relevant for parents of a newborn child. Following the procedure of Missler, Stroebe, and Van der Laan (2013), we selected those items that, in our view, best captured their experience. One item was added because it was considered to be central to the parenting stress construct (at least for parents with very young children): 'The responsibility I have for my children weighs on me' (Missler et al., 2013). An example item is: 'I feel restricted by my responsibilities as a parent'. For the administration before birth (t0 and t1), the items were slightly rephrased to capture possible stress-raising expectations of parenthood: ' I expect to feel restricted by my responsibilities as a parent'. Response options vary from 1 (Totally disagree) to 6 (Totally agree). A total score can be derived by summing the individual item scores. This total score (including the added item) ranges from 11 (no stress) to 66 (very high stress).

Secondary outcomes

Secondary outcomes are paternal parenting stress, parental well-being, quality of caregiving, and infant well-being and health.

Paternal parenting stress will be measured with the same 10 items of the Dutch version of the Parenting Stress Index (PSI; De Brock, et al., 1992a; Abidin, 1983) used for measuring maternal parenting stress. For more details, see above.

Parental well-being is defined as: depressive symptoms (1), symptoms of anxiety (2), satisfaction with the parental role (3), parental self-efficacy (4), and sleep quality and quantity (5).

1) Depressive symptoms will be measured with the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987; Dutch translation Pop, Komproe, & Van Son, 1992). This scale consists of 10 items. Participants can indicate the experienced frequency of each depression-related statement on a 4-point scale. Items are scored 0, 1, 2 or 3 (items 3, 5, 6, 7,8, 9 and 10 are reverse scored). Total scores range from 0 (no depressed feelings) to 30 (severe depressed feelings). The scale shows good psychometric properties: Pop et al. (1992) reported an internal consistency of .82 (Cronbach's alpha) and sufficient concurrent validity.

2) Symptoms of anxiety will be measured with the 7 items of the anxiety subscale of the Hospital Anxiety and Depression Scale (HADS; Olsson, Mykletun, & Dahl, 2005; Spinhoven, Ormel, Sloekers, Kempen, Speckens, & Van Hemert, 1997). For each item, participants can indicate on a 4-point scale how much anxiety they experience. Total scores on the anxiety subscale vary from 0 (no anxiety) to 21 (severe anxiety). Spinhoven et al. (1997) reported good psychometric properties for the Dutch version.

3) Satisfaction with the parental role will be measured with 3 items of the Dutch translation of the Parenting Stress Index (PSI; Loyd & Abidin, 1985; De Brock et al., 1992). Following the procedure of Missler et al. (2013) 4 items were added to this scale. Adding items was necessary because to our knowledge, no measure of parenting satisfaction currently exists. We thus decided to use this composed scale. An example item is: 'I enjoy spending time with my child'. For the

administration before birth (t0 and t1), the items were rephrased such that the expectation of parents of their satisfaction with their new role after the birth of their child became central: 'I expect I will enjoy spending time with my child'.

4) Parents will be asked to rate their efficacy as a parent on a 5-point scale, ranging from 1 (Not very good) to 5 (A very good parent; Cook et al., 2012; Hiscock et al., 2014; Sanson et al., 2002).

5) Sleep quality and quantity is measured with two items of the Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, Kupfer, 1989) adapted by Cook et al., 2012. The quality item is: 'Over the last two weeks, how would you rate your own sleep quality?' Response options are: 'Not nearly good enough'; 'Not quite good enough'; 'Good enough'; and 'More than good enough'. The quantity item is: 'Over the last two weeks, how would you rate your own sleep quantity?', with the following response options: 'Not nearly enough'; 'Not quite enough'; 'Enough'; and 'More than enough'.

Quality of caregiving will be measured by assessing the bonding between parent and child, the duration of breastfeeding, and the duration of room-sharing at 10 weeks postpartum.

1) Bonding will be measured with the Maternal Postnatal Attachment Scale (MPAS; Condon & Corkindale, 1998; Van Bussel, Spitz, & Demyttenaere, 2010). This scale consists of 19 statements referring to parent-child relationship. Each statement can be answered on a 2-point; 4-point; or 5-point scale. An example item is: 'When I am with the baby, I feel tense and fearful.' Total scores range from 19 to 95 and can be computed by summing up individual item scores. Low total scores indicate bonding problems between parent and child. Van Bussel et al. (2010) reported a Cronbach's alpha of .75 of the MPAS when administered 8-12 weeks after birth.

2) Breastfeeding will be assessed by measuring the duration (in weeks) of breastfeeding and/or breastfeeding mixed with bottle-feeding

3) Room-sharing will be measured as the duration (in weeks) of room-sharing (the infant sleeps in the room of the parents at night).

Infant well-being and health

The well-being of the infant will be measured through a diary (72hrs at 6 weeks postpartum) assessing crying, sleeping (Barr, Kramer, Boisjoly, McVey-White, and Pless, 1988) and feeding. Parents are supposed to rate with 5-minute slots precision using different symbols. The following behaviors will be assessed: asleep, awake and being content, awake and being fussy, awake and crying, awake and feeding; awake and sucking (thumb/dummy). Parents can also indicate the time and duration of feeding, and the type of feeding (breastmilk (through breastfeeding or bottle) or formula milk). Parents are asked whether the rated 72h-period can be viewed as a 'typical' period or not. Furthermore, we will ask parents at 6 and 10 weeks after birth whether they are experiencing a problem with infant sleep (day or night), crying or feeding, and if so, to rate the severity of this problem on a 7-point Likert scale ranging from 1 (hardly any problem) to 7 (a severe problem) (Hiscock et al., 2014). Infant health is measured in terms of somatic indices and somatic problems (at 6 and 10 weeks after birth). Parents are asked about their infant's weight, length and head circumference and parents will be asked to indicate whether their child has experienced fever, a runny nose, any coughing, inflammation of the eyes or diaper rash. Additionally, parents are asked if their child experienced some other medical condition and whether their child has been using any medication.

Birth

Variables related to the delivery and the birth are assessed 2 weeks after birth: birth weight, Apgar score, spontaneous delivery, caesarean section, birth complications. We will test whether there are differences between the intervention and control group for these variables (measuring possible stress factors during the delivery) in the analyses.

Marital satisfaction

Marital satisfaction is measured with the global satisfaction items of The Investment Model Scale (IMS; Rusbult, Martz, & Agnew, 1998; Dutch translation Montgomery, Peeters, Schaufeli, & Panagopoulou, 2008). This scale consists of 5 items, with answering options varying from 1 (Totally disagree) to 9

(Totally agree). An example item is: 'My relationships fulfils my needs for intimacy.' The total score ranges from 5 (not satisfied) to 45 (very satisfied). Montgomery et al. (1998) report a Cronbach's alpha of .93. Again, we will test for potential differences on this variable between the two groups.

Intervention uptake

Finally, we measure the uptake of the intervention at 10 weeks after birth, by asking parents whether they have read and watched the materials before the birth of their child. We also ask them whether they looked into the materials again after the birth of their child. Additionally, we monitor online the duration and frequency of watching (parts) of the video. Furthermore, we ask them to rate the frequency of using the information in their daily lives, with the item: 'How many times did you use the information from the booklet, video, or the home visit during the daily care for your baby?' Response options were: 'Daily'; 'Several times a week'; 'About once a week'; 'About once every two weeks'; 'About once a month'; 'Never'. We also ask them to rate the usefulness of the booklet, video, and the home visit on a 5-point scale ranging from 'Not very useful' to 'Very useful'.

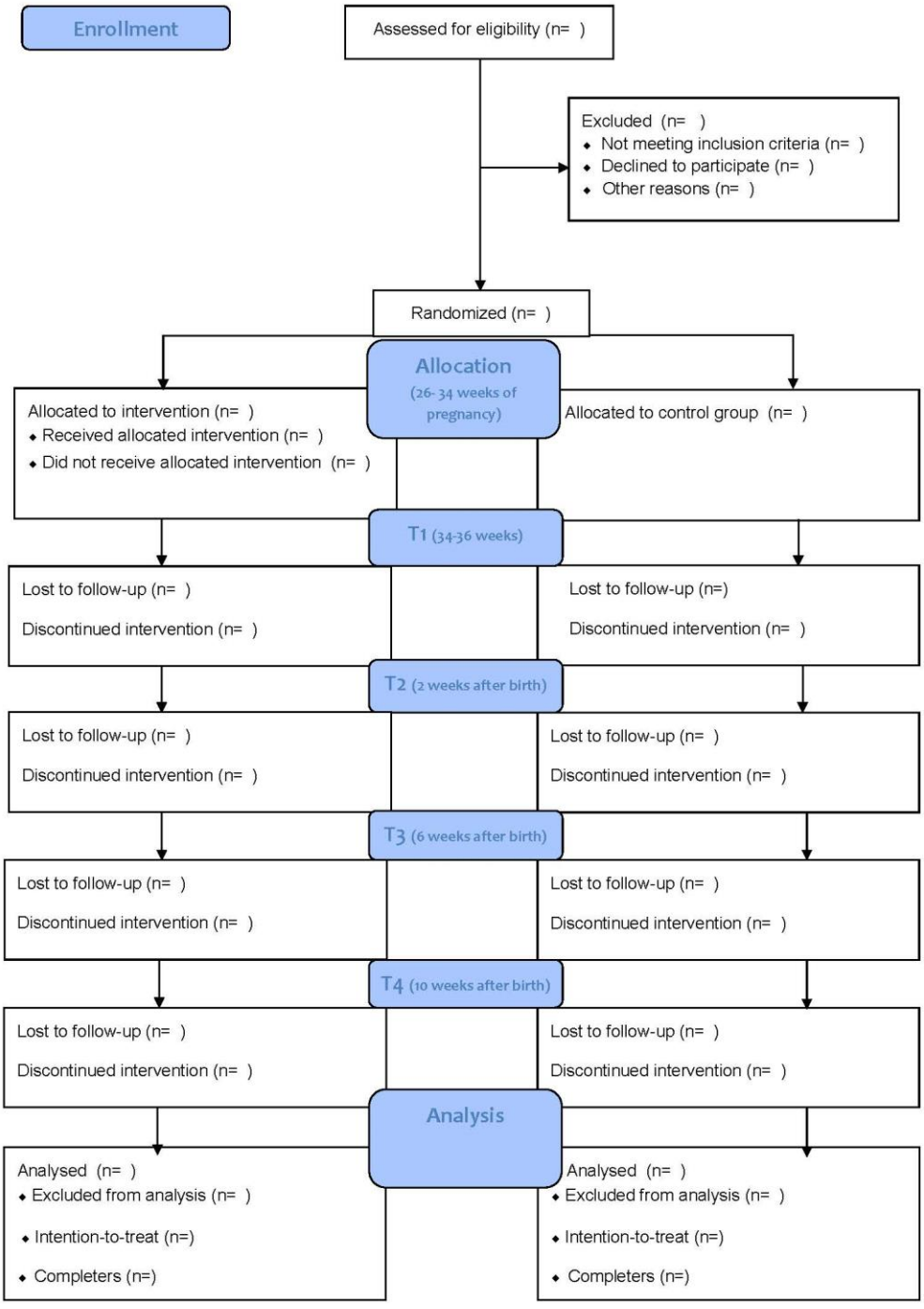
Data management

We will keep one file in which research identifiers are linked to participant's names and (e-mail) addresses. This file will be encrypted and password protected and only be available to the main researchers. All on- and offline data will be safely stored at the university on research identifier only.

Statistical analysis

The study will be conducted in adherence to the CONSORT statement. We will perform intention-to-treat analysis, in which all patients who are randomized will be analysed (independent of treatment or study completion), as well as completers-only analyses. Completers are defined as participants that completed all measurements. Baseline data will be explored to see if there are differences between the group that remains in the study and the group that drops out.

Figure 3. *Consolidated Standards of Reporting Trials (CONSORT) flow diagram.*



After screening for eligibility, participants are randomized in either the intervention or the control group. Follow-up measurements take place at 34-36 weeks of pregnancy (t1); 2 weeks after birth (t2; delivery characteristics); 6 weeks after birth (t3); and 10 weeks after birth (t4).

Primary outcome

We will compare the parenting stress scores between the two groups using a mixed multilevel model. This way, we can account for the nested structure of the data (mothers and fathers that belong to the same couple). Including both mothers and fathers in one analysis, will positively affect the power of the analyses. Furthermore, the analysis is also robust for missing data (Tabachnik & Fidell, 2013) and unequal sample sizes (more participating mothers than fathers). We will test interaction terms between parental sex (mother versus father) and intervention group (intervention versus control), to test whether the (possible) effect of the intervention is the same for both mothers and fathers. We will also calculate the between-group effect sizes at 6 (T3) and 10 weeks postpartum (T4). We will calculate Cohen's *d* by subtracting the two mean scores and dividing them by the pooled standard deviations. A Cohen's d of 0.2 can be assumed small, 0.5 to be moderate and 0.8 to be large (Cohen, 1992).

Secondary outcomes

We will repeat the mixed multilevel models, and the calculation of Cohens' *d,* for all outcomes of parental well-being. Next, to determine the effect of the intervention on the quality of caregiving after birth, we will add higher-quality caregiving as a secondary outcome variable to the model. Furthermore, to test whether prenatal well-being of the parents influences postpartum caregiving quality, we will use parental well-being (measured at 26 and 34 weeks of pregnancy) as a predictor of higher-quality caregiving. Finally, we will determine the effect of prenatal parental well-being on infant outcomes postpartum (mediated by higher-quality caregiving). For each of the outcomes we will calculate the between-group effect size at T3 and T4 and their 95% confidence interval. Gender will be added as an interaction term to the model, to see if there are differences between mothers and fathers.

Demographic data, attachment style of the parents and data related to the delivery and birth (birth weight, Apgar score, spontaneous delivery, caesarean section, birth complications) will be used as control variables in the model.

Data monitoring

Since the current intervention is a non-pharmacological intervention, it is unlikely that adverse effects due to the intervention will occur. Therefore, installing a Data Monitoring Safety Board does not seem warranted (see Committee for Medicinal Products for Human Use, 2005, pp. 4-5).

Harms

We consider this study to have negligible risks. One possibility is that the parents become aware of possible postpartum stressors and therefore become more stressed instead of less stressed. To prevent this rise of stress levels in both groups, we will take specific action. We will underline to the parents from the intervention group that we do not expect them to implement the intervention in a perfect way. We will explicitly give them the opportunity to make their own choices regarding the advice given in the booklet. Parents are completely free to determine which of the tools provided in the intervention they would like to use.

For the control group, we will stress that the intervention is a way of extra support, not the solution to prevent problems. They will be granted access 10 weeks after birth.

Amendments

All substantial amendments will be notified to the METC and to the competent authority.

Non-substantial amendments will not be notified to the accredited METC and the competent authority, but will be recorded and filed by the sponsor.

Dissemination policy

MM and RB will process the data, and both positive and negative findings will be disclosed, unreservedly. Results will be submitted for publication to peer-reviewed scientific journals. The participating parents as well as the participating midwife centers will receive updates on the study's progress. At the end of the project, results and conclusions will be presented to all those involved.

Discussion

This goal of this study is to examine the effectiveness of a psycho-educational intervention to prevent postpartum parental distress and enhance infant well-being. In contrast to other interventions, this intervention will be offered (1) already before birth (2) to all parents-to-be, regardless of their risk of postpartum distress and (3) including fathers.

We expect parents to experience less distress and higher well-being after the birth of their child compared to parents who do not receive this intervention. In turn, we expect that this will have positive effects on the quality of their caregiving, and ultimately on the infant's well-being and health, resulting in less parent-reported problems with sleeping, crying, and feeding, and increased infant health.

The intervention is focused on sensitive caregiving, that is, responding timely and adequately to the infant's needs. The booklet consists of four chapters; on making contact and sensitive responding; crying; feeding; and sleeping. A video is available to illustrate the topics mentioned in the booklet. During a prenatal home visit, the provided materials will be discussed. After birth, parents receive a supportive phone call. Throughout the intervention, it will be underlined that no part of the intervention is meant to be prescriptive, rather, the intervention has been developed to support parents in choosing those elements that are most helpful for them in their specific situation. Indeed, by offering the intervention we aim to stimulate parents to think about and discuss the information provided, whether or not they will implement everything they have learned. This way, we expect both parents to be better equipped for the transition to parenthood.

In our view the timing of implementation of our psycho-educational intervention is crucial. By intervening already during pregnancy (and continuing to offer support during the first months after birth), our aim is to prevent or mitigate distress among parents and infants – and related problems with breastfeeding and room-sharing – during the first hours, days and weeks of the infant's life. In this way, the infant's health and early development can optimally benefit. The intervention is low-cost, easy to implement, and can be distributed on a large scale: a large number of parents and infants can thus be supported during a crucial period of their lives.

Trial status

Recruitment started in November 2016 and is ongoing. In November 2016, the first participants enrolled. Currently, 59 participants have signed the informed consent form and are thus participating in the study (9 of them have completed the study protocol).

References

Abidin, R. (1983). Parenting stress index: manual. Charlottesville, VA: Pediatric Psychology Press.

Ainsworth, M.S., Blehar, M.C., Waters, E., & Wall, S. (1978). Patterns of attachment: A psychological study of the strange situation. 3rd ed. Oxford: Lawrence Erlbaum.

Bakermans-Kranenburg, M.J., Van IJzendoorn, M.H., & Juffer, F. (2003). Less is more: meta-analyses of sensitivity and attachment interventions in early childhood. *Psychological. Bulletin*, *129*, 195-215. https://doi.org/10.1037/0033-2909.129.2.195

Ball, H.L. (2003). Breastfeeding, bed-sharing, and infant sleep. *Birth*, *30*, 181-188. https://doi.org/10.1046/j.1523-536X.2003.00243.x

Ball, H.L., Ward-Platt, M.P., Heslop, E., Leech, S.J., & Brown, K.A. (2006). Randomised trial of infant sleep location on the postnatal ward. *Archives of Disease in Childhood*, *91*, 1005-1010. http://dx.doi.org/10.1136/adc.2006.099416

Barr, R.G., Kramer, M.S., Boisjoly, C., McVey-White, L., & Pless, I.B. (1988). Parental diary of infant cry and fuss behavior. *Archives of Disease in Childhood*, *63*, 380-387. http://dx.doi.org/10.1136/adc.63.4.380

Bartholomew, K., & Horowitz, L.M. (1991). Attachment styles among young adults: a test of a four-category model. *Journal of Personality and Social Psychology*, *61*, 226-244.

Bartick, M., & Smith, LJ. (2014). Speaking out on safe sleep: Evidence-based infant sleep recommendations. *Breastfeeding Medicine*, *9*, 417-22.

Beijers, R., Jansen, J., Riksen-Walraven, M., & De Weerth, C. (2010). Maternal prenatal anxiety and stress predict infant illnesses and health complaints. *Pediatrics*, *126*, 401- 409. https://doi.org/10.1542/peds.2009-3226

Beijers, R.J., Riksen-Walraven, M., & De Weerth, C. (2013). Cortisol regulation in 12-month- old human infants: Associations with the infant's early history of breastfeeding and co-sleeping. *Stress*, *16*, 267-77. https://doi.org/10.3109/10253890.2012.742057

Beijers, R., Cillessen, L., & Zijlmans, M. (2016). An experimental study on mother-infant skin-to-skin contact in full-terms. *Infant Behavior and Development*, *43*, 58-65. https://doi.org/10.1016/j.infbeh.2016.01.001.

Brennan, K.A., Clark, C., & Shaver, P.R. (1998). Self-report measurement of adult attachment: An integrative overview. In J.A. Simpson JA, & W.S. Rholes (Eds), *Attachment theory and close relationships* (pp. 46-76). New York: Guilford Press.

Brennan, P. A., Hammen, C., Andersen, M. J., Bor, W., Najman, J. M., & Williams, G. M. (2000). Chronicity, severity, and timing of maternal depressive symptoms: Relationships with child outcomes at age 5. *Developmental Psychology, 36*, 759–766. https://doi.org/10.1037/0012-1649.36.6.759

Buysse, D.J., Reynolds, C.F., Monk, T.H., Berman, S.R., & Kupfer, D.J. (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Research*, *28*, 193-213. https://doi.org/10.1016/0165-1781(89)90047-4.

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*, 155- 9. https://doi.org/10.1037/0033-2909.112.1.155

Condon, J.T., & Corkindale, C.J. (1998). The assessment of parent-to-infant attachment: Development of a self-report questionnaire. *Journal of Reproductive and Infant Psychology*, *16*, 57-76.

Conradi, H.J., Gerlsma, C., Van Duijn, M., & De Jonge, P. (2006). Internal and external validity of the experiences in close relationships questionnaire in an American and two Dutch samples. *The European Journal of Psychiatry*, *20*, 258- 69.

Cook, F., Bayer, J., Le, H.N.D., Mensah, F., Cann, W., & Hiscock, H. (2012). Baby business: a randomized controlled trial of a universal parenting program that aims to prevent early infant sleep and cry problems and associated parental depression. *BMC Pediatrics*, *12*, 13. https://doi.org/10.1186/1471-2431-12-13

Cox, J.L., Holden, J.M., & Sagovsky, R. (1987). Detection of postnatal depression: development of the 10-item Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry*, *150*, 782–790.

De Brock, A.J.L.L., Vermulst, A.A., & Gerris, J.R.A. (1992a). *Nijmeegse ouderlijke stress index: meetinstrument voor de vaststelling van stress bij opvoeders*. Lisse, The Netherlands: Swets & Zeitlinger.

De Brock, AJLL, Vermulst, AA, Gerris, JRM, & Abidin, RR. NOSIK. Lisse, The Netherlands: Swets & Zeitlinger; 1992b.

De Wolff, M.S., & Van IJzendoorn, M.H. (1997). Sensitivity and attachment: a meta-analysis on parental antecedents of infant attachment. *Child Development*, *68*, 571-591. https://doi.org/10.1111/j.1467-8624.1997.tb04218.x

Downey, G., & Coyne, J.C. (1990). Children of depressed parents: an integrative review. *Psychological Bulletin*, *108*, 50-76.

Edelstein RS, Weede Alexander K, Shaver PR, Schaaf JM, Quas, JA, Lovas, GS, & Goodman GS. (2004). Adult attachment style and parental responsiveness during a stressful event. *Attachment & Human Development*, *6*, 31-52. https://doi.org/10.1080/14616730310000165958 4

Fearon, R.P., Bakermans-Kranenburg, M.J., Van IJzendoorn, M.H., Lapsley, A.-M. and Roisman, G.I. (2010), The Significance of Insecure Attachment and Disorganization in the Development of Children's Externalizing Behavior: A Meta-Analytic Study. *Child Development*, *81*, 435-456. https://doi.org/10.1111/j.1467-8624.2009.01405.x

Gelfand, D.M., & Teti, D.M. (1990). The effects of maternal depression on children. *Clinical Psychology Review*, *10*, 329-353. https://doi.org/10.1016/0272-7358(90)90065-I.

Groh, A.M., Roisman GI, IJzendoorn MH, Bakermans-Kranenburg MJ, Fearon RP. (2012). The significance of insecure and disorganized attachment for children's internalizing symptoms: a meta-analytic study. *Child Development*, *83*, 591–610. https://doi.org/10.1111/j.1467-8624.2011.01711.x

Hiscock HA, Cook F, Bayer J, Le, H, Mensah F, Cann W, Symon B, & St. James-Roberts I. (2014). Preventing early infant sleep and crying problems and postnatal depression: A randomized trial. *Pediatrics*, *133*, 346-54. https://doi.org/10.1542/peds.2013-1886

Horta, B.L., & Victora, C.G. (2013). Long-term effects of breastfeeding: a systematic review. World Health Organization.

Horta, B.L., Loret de Mola, C., Victora, C.G. (2015). Breastfeeding and intelligence: a systematic review and meta-analysis. *Acta Paediatrica*, *104*, 14-19. https://doi.org/10.1111/apa.13139

Isabella, R.A., Belsky, J., & Von Eye, A. (1989). Origins of infant-mother attachment: an examination of interactional synchrony during the infant's first year. *Developmental Psychology*, *25*, 12-21. https://doi.org/10.1037/0012-1649.25.1.12

Jia, R., Kotila, L.E., Schoppe-Sullivan, S.J., & Kamp Dush, C.M. (2016). New parent's psychological adjustment and trajectories of early parental involvement. *Journal of Marriage and the Family*, *78*, 197-211. https://doi.org/10.1111/jomf.12263

Kempler, L., Sharpe, L., Miller, C.B., & Bartlett, D.J. (2016). Do psychosocial sleep interventions improve infant sleep or maternal mood in the postnatal period? A systematic review and meta-analysis of randomised controlled trials. *Sleep Medicine Reviews*, *29*, 15-22. https://doi.org/10.1016/j.smrv.2015.08.002

Klein Velderman, M., Bakermans-Kranenburg, M. J., Juffer, F., & van IJzendoorn, M. H. (2006). Effects of attachment-based interventions on maternal sensitivity and infant attachment: Differential susceptibility of highly reactive infants. *Journal of Family Psychology*, *20*, 266–274. https://doi.org/10.1037/0893-3200.20.2.266

Lafontaine, M.F., Brassard, A., Lussier, Y., Valois, P., Shaver, P.R., & Johnson, S.M. (2016). Selecting the best items for a short-form of the Experiences in Close Relationships Questionnaire. *European Journal of Psychological Assessment*, *32*, 140-154. http://dx.doi.org/10.1027/1015-5759/a000243

Loyd, B.H., & Abidin, R.R. (1985). Revision of the Parenting Stress Index. *Journal of Pediatric Psychology*, *10*, 169-77. https://doi.org/10.1093/jpepsy/10.2.169

Lovejoy, M.C., Graczyk, P.A., O'Hare, E., Neuman, G. (2000). Maternal depression and parenting: a meta-analytic review. *Clinical Psychology Review*, *20*, 561- 92. https://doi.org/10.1016/S0272-7358(98)00100-7

Maycock, B., Binns, C.W., Dhaliwal, S., Tohotoa, J., Hauck, Y., Burns, S., & Howat, P. (2013). Education and support for fathers improves breastfeeding rates. A randomized controlled trial. *Journal of Human Lactation*, *29*, 484-90. https://doi.org/10.1177/0890334413484387

Montgomery, A.J., Peeters, M.C.W., Schaufeli, W.B. & Panagopoulou, E.P. (2008). Cross-over and work-home interference. *The Irish Journal of Psychology*, *29*, 61-76. https://doi.org/10.1080/03033910.2008.10446274

O'Brien, M., Buikstra, E., Fallon, T., & Hegney, D. (2008). Exploring the influence of psychological factors on breastfeeding duration, phase 1: perceptions of mothers and clinicians. *Journal of Human Lactation*, *25*, 55-63. https://doi.org/10.1177/0890334408326071

O'Hara MW, & McCabe, JE. (2013). Postpartum depression: Current status and future directions. *Annual Review of Clinical Psychology*, *9*, 379-407. https://doi.org/10.1146/annurev-clinpsy-050212-185612

Olsson, I., Mykletun, A., & Dahl, A.A. (2005). The hospital anxiety and depression rating scale: A cross-sectional study of psychometrics and case finding abilities in general practice. *BMC Psychiatry*, *5*, 46. https://doi.org/10.1186/1471-244X-5-46

Paulson, J.F., Dauber, S., Leiferman, J.A. (2006). Individual and combined effects of postpartum depression in mothers and fathers on parenting behavior. *Pediatrics*, *118*, 659-668. https://doi.org/10.1542/peds.2005-2948

Pisacane, A., Continisio, G.I., Aldinucci, M., D'Amora, S., & Continisio, P. (2005). A controlled trial of the father's role in breastfeeding promotion. *Pediatrics*, *116*, 494-8. https://doi.org/10.1542/peds.2005-0479

Pop, V.J., Komproe, I.H., & Van Son, M.J. (1992). Characteristics of the Edinburgh Postnatal Depression Scale in The Netherlands. *Journal of Affective Disorders*, *26*, 105-10. https://doi.org/10.1016/0165-0327(92)90041-4.

Ramchandani P, Stein A, Evans J, & O'Connor T. (2005). Paternal depression in the postnatal period. *The Lancet*, *365*, 2201-05. https://doi.org/10.1016/S0140-6736(05)66778-5

Rollins, J. (2017). Sharing a room: updated recommendations for a safe infant sleeping environment. *Pediatric Nursing*, *43*, 7.

Rusbult, C.E., Martz, J.M., & Agnew, C.R. (1998).The Investment Model Scale: Measuring commitment level, satisfaction level, quality of alternatives, and investment size. *Personal Relationships*, *5*, 357-91. https://doi.org/10.1111/j.1475-6811.1998.tb00177.x

Sanson, A., Nicholson, J., Ungerer, J. et al. (2002). Introducing the Longitudinal Study of Australian Children (LSAC Discussion Paper No.1). Melbourne, Australia: Australian Institute of Family Studies.

Smeekens, S., Riksen-Walraven, J.M., & Van Bakel, H.J.A. (2007). Multiple determinants of externalizing behavior in 5-year-olds: a longitudinal model. *Journal of Abnormal Child Psychology*, *35*, 347-61. https://doi.org/10.1007/s10802-006-9095-y

Spinhoven PH, Ormel J, Sloekers PPA, Kempen GIJM, Speckens AEM, & Van Hemert AM. A validation study of the Hospital Anxiety and Depression Scale (HADS) in different groups of Dutch subjects. (1997). *Psychological Medicine*, *27*, 363-70.

Sroufe, A.L. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. 2005: *Attachment & Human Development*, *7*, 349-367.

Tabachnik, B.G., & Fidell, L.S. (2007). Multilevel linear modeling. In S. Hartman (Ed.), *Using Multivariate Statistics* (pp. 781-857). Boston, MA: Pearson Education Inc.

Tambelli, R., Cerniglia, L., Cimino, S., & Ballarotta, G. (2015). Parent-infant interactions in families with women diagnosed with postnatal depression: a longitudinal study on the effects of a psychodynamic treatment. *Frontiers in Psychology*, *6*, 1210. https://doi.org/10.3389/fpsyg.2015.01210

Tharner, A., Luijk, M.C.P.M., Raat H, IJzendoorn MH, Bakermans-Kranenburg MJ, Moll HA, Jaddoe VWW, Hofman A, Verhulst FC, & Tiemeier H. (2012). Breastfeeding and its relation to maternal sensitivity and infant attachment. *Journal of Developmental & Behavioral Pediatrics*, *33*, 396-404. https://doi.org/10.1097/DBP.0b013e318257fac3

TNO. (2011). Peiling veilig slapen 2010/2011. Leiden: TNO.

TNO. (2015). Peiling melkvoeding van zuigelingen 2015. Leiden: TNO.

Tollenaar, M.S., Beijers, R., Jansen, J., Riksen-Walraven, J.M., & De Weerth, C. (2012). Solitary sleeping in young infants is associated with heightened cortisol reactivity to a bathing session but not to a vaccination. (2012). *Psychoneuroendocrinology*, *37*, 167-77. https://doi.org/10.1016/j.psyneuen.2011.03.017

Van Bussel, JCH, Spitz B, & Demyttenaere K. (2010).Three self-report questionnaires of the early mother-to-infant bond: reliability and validity of the Dutch version of the MPAS, PBQ and MIBS. *Archives of Women's Mental Health*, *13*, 373-84. https://doi.org/10.1007/s00737-009-0140-z

Van Doesum KTM, Riksen-Walraven JM, Hosman CMH, & Hoefnagels C. (2008). A randomized controlled trial of a home-visiting intervention aimed at preventing relationship problems in depressed mothers and their infants. *Child Development*, *79*, 547-61. https://doi.org/10.1111/j.1467-8624.2008.01142.x

Van Scheppingen, M. A., Denissen, J. J. A., Chung, J. M., Tambs, K., & Bleidorn, W. (2018). Self-esteem and relationship satisfaction during the transition to motherhood. *Journal of Personality and Social Psychology*, *114*, 973–991. https://doi.org/10.1037/pspp0000156

Victora, C.G., Bahl, R., Barros, A.J.D., França, G.V.A., Horton, S., Krasevec, J., Murch, S., Jeeva Sankar, M., Walker, N., Rollins, N.C. (2016). Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *The Lancet*, *387*, 475-490. https://doi.org/10.1016/S0140-6736(15)01024-7

World Health Organization. (2017). Breastfeeding. http://www.who.int/topics/breastfeeding/en/. Accessed 21 March 2017.

6

Effectiveness of a psycho-educational intervention for expecting parents to prevent postpartum parenting stress, depression and anxiety: a randomized controlled trial

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Abstract

Background: The first months postpartum can be challenging for parents, leading to elevated symptoms of parenting stress, depression and anxiety. In turn, distressed parents are at higher risk for providing suboptimal quality of caregiving. As psychoeducational interventions can be effective in reducing psychological distress, the goal of this randomized controlled trial was to examine the effectiveness of low-intensity universal psychoeducational program to prevent postpartum parenting stress, and to enhance parental well-being and caregiving quality.

Method Between 26-34 weeks of pregnancy, 138 pregnant women and 96 partners were randomized to the intervention or a waitlist control group. The intervention consisted of a booklet, a video, a home visit, and a telephone call. Information was provided on (1) sensitive responsiveness, adapting to the parental role, and attending to own needs; (2) crying patterns; (3) feeding (arrangements); and (4) sleeping (arrangements). The primary outcome was parenting stress postpartum. Secondary outcomes were additional measures of distress (depression and anxiety), parental well-being, and caregiving quality.

Results Both groups showed a rise in distress after birth. No between-group differences were observed on parenting stress, nor on the secondary outcomes. The intervention was rated as useful and of added value by the parents.

Conclusion This study offered no evidence that our universal prevention program was effective in decreasing parental distress or in increasing caregiving quality. However, parents found aspects of the intervention useful. More research is needed, including a longer period of follow-up as well as observational measures of parents' responsiveness.

Trial registration This trial has been registered on 15 September 2016 in the Netherlands National Trial Register, ID: NTR6065, https://www.trialregister.nl/trial/5782.

Key words: psycho-education, universal prevention program, randomized controlled trial, parenting stress, pregnancy

The transition to parenthood is an important and challenging life event that can be accompanied by significant distress. Parents of a newborn report doubts about their own parenting skills (Henshaw, Cooper, Jaramillo, Lamp, Jones, & Wood, 2018) and feeling overwhelmed by the seemingly unlimited demands that come with the parenting role (Young, Roberts, & Ward, 2020). This results in lowered self-efficacy (Hong Law, Dimmock, Guelfi, Nguyen, Gucciardi, & Jackson, 2019) and reduced self-esteem (Van Scheppingen, Denissen, Chung, Tambs, & Bleidorn, 2018). Moreover, these types of parenting distress seem to be associated with more general symptoms of depression, anxiety and stress in the first months after birth (Hong Law, Dimmock, Guelfi, & Jackson, 2019; Leigh & Milgrom, 2008). Prevalence rates for maternal postpartum depression symptomatology range between 8 and 40% (Heron, O'Connor, Evans, Golding, & Glover, 2004; Yelland, Sutherland, & Brown, 2010; McCoy, Beal, Shipman, Payton, Watson, 2006; Morris-Rush, Freda, & Bernstein, 2003), and for postpartum anxiety symptomatology between 13 and 40% (Glasheen, Richardson, & Fabio, 2010; Field, 2018). Importantly, about 10% of fathers report symptoms of depression, anxiety and stress after the birth of their child as well (Paulson, Dauber, & Leiferman, 2006; Matthey, Barnett, Howie, & Kavanagh, 2003). Moreover, next to compromising parents' own health, parental postpartum psychological distress forecasts more problems in the child's emotional, behavioural, and cognitive development (e.g. Brennan et al., 2000; Field, 2018; Meaney, 2018; Murray et al., 2015). Clearly, there is a need to decrease symptoms of parenting stress and enhance parental well-being in the postpartum period.

Meta-analytic evidence indicates that brief psychoeducational interventions aimed at providing information can be effective in reducing symptoms of psychological distress (Donker, Griffiths, Cuijpers, & Christensen, 2009). Because these interventions are easy to implement and low-cost, they provide a fruitful option for universal prevention research. The primary goal of the present randomized controlled trial (RCT) was to examine the effectiveness of a brief universal prevention program to prevent postpartum symptoms of parenting stress. Parenting stress is the result of an experienced discrepancy between the demands associated with the parenting role and the available resources to fulfil these demands (Abidin, 1992). As parents report a need for reliable and non-judgmental information about parenting a newborn (Henshaw et al. 2018), we expect our psychoeducational intervention to be such a resource and to decrease parenting stress. Secondary aims of this study were to examine if the intervention was also effective in preventing general symptoms of depression, anxiety and stress and in enhancing the quality of parental caregiving.

Parental distress and quality of care

The proposed mechanism behind the associations between parental parenting distress and child outcomes is that parental distress negatively affects the quality of parenting (Crnic et al. 2005; Koss & Gunnar, 2018; Stein et al., 2014). For example, distresscan prevent parents from focusing their attention on, and responding in a timely and sensitively manner to their infant's needs (Stein et al., 2014). Parental sensitivity is important for a range of child outcomes, including the formation of a secure attachment relationship between infants and their parents, social competence, regulatory capacities, and lower stress levels (e.g. Bakermans-Kranenburg, Van IJzendoorn, & Juffer, 2003; De Wolff & Van IJzendoorn, 1997; Fearon, Bakermans-Kranenburg, Van IJzendoorn, Lapsley, & Roisman, 2010; Groh, Roisman, Van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012; Isabella, Belsky, & Von Eye, 1989; Smeekens, Riksen-Walraven, & Van Bakel, 2007, Sroufe, 2005).

Next to sensitivity, parental distress can compromise the formation of the strong affective tie from parent to infant (De Cock et al., 2016), commonly referred to as the maternal or paternal bond. This bond has been defined as the tie from parent to infant that facilitates parent-infant proximity and caregiving behavior, such as warmth and sensitivity (Jansen, De Weerth, & Riksen-Walraven, 2008; Osher et al., 2020). Lower quality of the parent-infant bond has been related to problems in children's socio-emotional development (De Cock et al., 2016; Mason et al., 2011). Bonding has also been related, through parenting stress, to child executive functioning at 24 months postpartum (De Cock et al., 2017). This study found that, for both mothers and fathers, feelings of bonding negatively predicted experienced parenting stress over time. In addition, for both parents, a negative indirect effect of bonding on child executive functioning problems was found via experienced parenting stress. As parenting stress is suggested to provide the child with a more negative, less predictive, and chaotic environment, these environmental circumstances can negatively affect the child's own stress levels and subsequent neurocognitive development, but also prevent the child from a stimulating environment necessary for executive functioning skills to develop (Crnic et al., 2005).

Parental distress might also affect caregiving practices, including breastfeeding and room-sharing arrangements, which are important for infant development. For example, maternal depression and anxiety have been linked to a shorter duration of breastfeeding (Castro Dias & Figueiredo, 2015; Hoff, Movva, Vollmar, & Pérez-Escamilla, 2019). The World Health Organization recommends exclusive breastfeeding during the first six months after birth (WHO, 2017). Breastfeeding has important and well-established beneficial effects on the child's physical and mental health, for example protection against of infections and diabetes, and more favorable cognitive development (Horta, Loret de Mola, & Victora, 2015; Victora et al., 2016). With regard to room-sharing, the American Academy of

Pediatrics (AAP) recommends that children should sleep within the same room as the parents (in a separate cot) during the first six months after birth (Moon & the Task Force on Sudden Infant Death Syndrome, 2016), as parent–infant room sharing is associated with reduced rates of Sudden Infant Death Syndrome (SIDS e.g., Rollins, 2017; Tappin, Ecob, & Brooke, 2005). Also, the availability of the parents seems to help buffering the infant's distress (Beijers, Riksen-Walraven, & De Weerth, 2013; Tollenaar, Beijers, Jansen, Riksen-Walraven & De Weerth, 2012), and facilitates the breastfeeding process (Ball, 2003; McKenna, Ball, & Gettler, 2007; Baddock, Purnell, Blair, Pease, Elder, & Galland, 2019). This RCT will thus also examine the effectiveness of the universal prevention program to increase parental caregiving quality (i.e. increased parental bonding, longer breastfeeding duration, and longer room-sharing duration).

Universal, selected and indicated prevention of parental distress

There are interventions that focus on the prevention of the development of clinical disorders (such as depressive or anxiety disorders) after birth. However, these interventions are mostly aimed at mothers with symptoms of clinical disorders (indicated prevention; e.g. Bittner et al., 2014; Austin et al., 2008) or on mothers who belong to certain risk groups for developing a disorder (selected prevention; e.g. Bayrampour et al., 2018; Dennis et al., 2017; Doyle et al., 2017). Examples of risk factors are a history of psychopathology, pregnancy complications or an infant born prematurely, adverse life events, low SES, or low social support (Bayrampour et al., 2018; Dennis et al., 2017; Doyle et al., 2017; Wajid et al., 2020).

Both indicated as well as selective prevention interventions have been proven to be effective in preventing depression (Clatworthy, 2012; Sockol, Epperson, & Barber, 2013; Sockol 2015; Sockol, 2018; US Preventive Service Task Force, 2019). However, much is unknown about the effectiveness of preventive interventions on other forms of distress beyond depression, such as anxiety and general stress (Evans et al., 2018; Sockol, 2018). Furthermore, much less is known about universally applicable interventions that target all pregnant women, without pre-existing symptomatology or risk factors (Evans et al., 2018; Sockol, 2018). This is important because research showed a high prevalence of parental symptomatology after birth, which extends in a more chronic level of sub-clinical symptomatology for about 20-30 % of parents during the first postpartum years (Wajid et al., 2020; Kiviruusu et al., 2020). In the absence of clear risk factors, this group of parents would not be targeted by existing (indicated and selected) preventive approaches. Since chronic sub-clinical symptomatology has also been linked to more negative child development (Meaney, 2018), this finding suggests the importance of a universal preventive approach.

Existing interventions focus almost exclusively on the mother, instead of also including the partner. However, fathers also experience a significant degree of distress in the postpartum period (Hughes, Devine, Foley, Ribner, Mesman, & Blair, 2020; Matthey et al., 2003; Paulson et al., 2006) and a growing body of evidence indicates that paternal distress is also associated with problems in children's emotional and behavioural development (Kvalevaag, Ramchandani, Hove, Assmus, Eberhard-Gran, Biringer, 2013; Sweeney & MacBeth, 2016). Furthermore, including partners in interventions has been positively associated with higher breastfeeding rates at 6 weeks postpartum (Maycock et al., 2013) and longer duration of the breastfeeding period (Pisacane, Continisio, Aldinucci, D'Amora, Continisio, 2005). Including partners seems thus to be important, not only for their own health and well-being, but also to prevent negative effects of paternal distress on infant development, as well as to enhance the quality of both parents' caregiving.

The current study

In summary, there is a high prevalence of both maternal (Heron et al., 2004; Yelland et al., 2010; McCoy et al., 2006; Morris-Rush et al., 2003; Glasheen et al., 2010; Field, 2018) as well as paternal postpartum distress symptomatology (Paulson et al., 2006; Matthey et al., 2003). Given the associations between parental symptomatology and the quality of parenting and, subsequently, child development (Goodman et al., 2011; Kvalevaag et al., 2013; Murray et al., 2015; Sweeney & MacBeth, 2016), there is a need for preventive interventions that are applicable to all expecting parents, both mothers and fathers, independent of pre-existing risk factors or symptomatology. Moreover, while existing interventions mainly focused on depression as an outcome measure, our main focus was on parenting stress. To be able to reach a broad range of parents and to foster real-world implementation, we developed an easy accessible and low-intensity intervention that can be implemented during pregnancy. The intervention consists of an information booklet, an educational video, and a prenatal home visit during pregnancy and a phone call during the first postpartum weeks. The intervention is targeted at both mothers and fathers. We will examine gender differences in distress outcomes, as well as differences in intervention effectiveness depending on prenatal levels of distress (i.e. between mothers and fathers with relatively high versus relatively low levels of distress during pregnancy). Lastly, this intervention is implemented in a Dutch sample. While there is a lack of data on parental postpartum distress in Dutch samples specifically, no indications are found that the Dutch context is different compared to other western countries.

We expected that the intervention would reduce parenting stress, as well as symptoms of depression and anxiety. Furthermore, by psycho-educating both parents already during pregnancy, we

expected parents to experience more self-efficacy and satisfaction in fulfilling their roles. By preventing symptoms of parenting stress, depression, and anxiety and stimulating parental well-being, mothers as well as fathers might perceive less problems with infant crying, feeding, and sleeping. Moreover, by psycho-educating parents about typical infant crying, feeding and sleeping patterns, we expected that parents would perceive less problems with these infant behaviors. Specifically, by psycho-educating parents about typical infant sleep patterns, including frequent night-wakings, we aimed to prepare parents for broken nights and a possible lack of sleep postpartum, and expected that parental perception of the quality and quantity of their own sleep would be enhanced. Furthermore, by preventing distress symptomatology, the quality of parents' caregiving (including bonding, breastfeeding and room-sharing) should be enhanced.

Materials and methods

Trial design

We used a randomized controlled trial with two parallel groups: an intervention and a waitlist control group. We used block randomization (blocks 6-8) stratified by birth order (first child/ no first child) and participation of the partner (yes/no). An independent researcher generated random number sequences with a 1:1 ratio and allocated each participant to either the control or the intervention group. Blinding of the researchers or the participants was not possible. The control group was offered access to the intervention after the final assessment, which was scheduled 10 weeks after birth. The design of the study was described in full in Missler, Beijers, Denissen, and Van Straten (2018).

Participants and recruitment

Pregnant women and their partners were recruited between November 2016 and February 2018 through online media and midwifery practices in the Netherlands. Information about the study was provided digitally through 1) online newsletters providing information about the 26th week of pregnancy; and 2) advertisements on websites where pregnant women could find general information about being pregnant and where they could get in touch with other pregnant women. Furthermore, midwifery practices handed pregnant women a flyer with information about the study. In the online newsletters and advertisements, as well as in the flyer, a link to the website of the study was provided, through which potentially interested pregnant women could register for the study. Inclusion criteria

were a) gestational age <34th weeks; b) no severe pregnancy complications (i.e. gestational diabetes or pre-eclampsia); c) sufficient Dutch language proficiency; and d) access to the internet. Exclusion criteria were: a) current psychological treatment for psychopathology or psychological treatment in the 6 months before registration and b) the development of severe pregnancy complications during the course of the study. There were no requirements with respect to baseline distress level. All women were eligible. Pregnant women could participate with or without their partner.

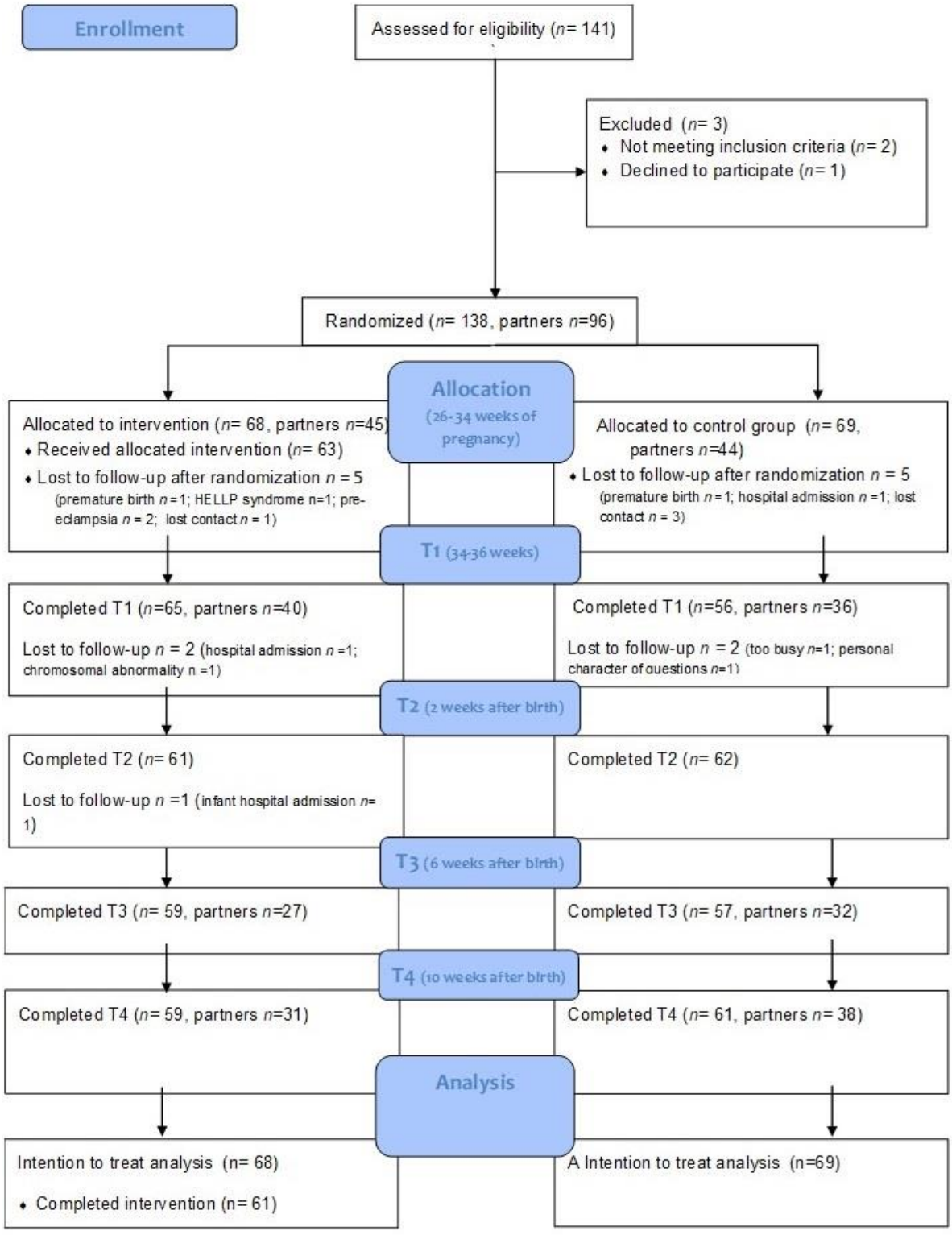
Sample size calculation

Hiscock et al. (2014) reported an odds ratio of .57 with regard to the prevention of maternal symptoms of depression in the intervention group. We converted this ratio into an effect size of *d*=.48. Using a power of 80% and setting alpha at .05, this resulted in a sample size of 64 participants per condition (total *n* = 128).

Procedure

Upon registering through the study website, interested parents received a digital information brochure of the study and an informed consent form. After providing informed consent, parents received a link to the baseline questionnaire. Upon completion, couples (or pregnant women participating without their partner) were randomly assigned to either the intervention or the control group. Online assessments took place at baseline (T0, between 26 and 34 weeks of pregnancy), 34–36 weeks of pregnancy (T1), 2 weeks after giving birth (T2), 6 weeks after birth (T3) and 10 weeks after birth (T4). At each point in time, parents received an e-mail with a link to the questionnaire (Figure 1). All parents were also offered the possibility to fill in the questionnaires by paper-and-pencil. None of them made use of this possibility. The study was registered at the Netherlands Trial Register (NTR6065). The study was approved by the Medical Ethical Committee Brabant (NL58528.028.16/P1620).

Figure 1. *Consolidated Standards of Reporting Trials (CONSORT) flow diagram.*



Intervention

The intervention consisted of (1) an information booklet; (2) an online video, (3) a prenatal home visit; and (4) a postnatal phone call. The booklet and video were received during pregnancy, after the baseline assessment (T0). Given that parenting stress and the quality of parenting can affect child development from birth onwards (Feldman, Eidelman, & Rotenberg, 2004; Hechler, Beijers, Riksen-Walraven, & De Weerth, 2019), we aimed to intervene already during pregnancy. Therefore, the main part of the intervention (booklet, video, home visit) was implemented before birth. This way, there was sufficient time for parents to digest and use the information in preparing for the birth of their child.

Booklet and video

The booklet consisted of four chapters on (1) interpreting of, and sensitive responding to, the infant's needs and signals of distress; as well as adapting to the parental role and attending to own needs, taking a sufficient amount of rest, and seeking support; (2) patterns of crying and different soothing techniques; (3) the infant's hunger signals and feeding arrangements (e.g. breastfeeding, availability of professional breastfeeding courses and support services, pumping and the use of a breast pump, formula feeding); and (4) sleeping patterns and sleeping arrangements (e.g. infant sleep development and consolidation, room-sharing, bed-sharing, and solitary sleeping). We based the booklet on the work of Hiscock et al (2014), which we further developed and extended based on recent empirical research and in collaboration with academic and clinical experts (Missler et al., 2018). The video provided illustrations of the topics described in the booklet. In the video, the experiences of upcoming parents were shown. An expert on infant development commented on the fragments, and parents were actively engaged in the video by stimulating them to think about and discuss with each other how they could implement the information within their own lives. The video was developed by psychologists with extensive knowledge on infant development and with experience in translating scientific knowledge into tools for practice (Stichting Babywerk, The Netherlands). Watching the video and responding to the questions took about 15-20 minutes. More details on the content of the booklet and/or the video can be found in Missler et al. (2018).

Prenatal home visit and postnatal phone call

Parents were asked to read and watch the materials before the prenatal home visit. The primary aim of the home visit was to discuss the information in the materials and to respond to the parent's questions. A secondary aim of the home visit was to explain the parents that no part of the provided information was meant to be prescriptive. Rather, we asked parents to think about how the information would fit their own and their child's needs, and to discuss how the information could be implemented in their lives. Thus, with the home visits, we aimed to offer both education and support. Another major reason for visiting parents in their homes is to facilitate their participation in the study and in the intervention (as parents did not have to travel to a clinic or parenting class). Furthermore, by visiting parents in their homes, we expected that especially for fathers there would be less of a barrier for participating in the study (Panter-Brick, Burgess, Eggerman, McAllister, Pruett, & Leckman, 2014). All parents were visited at their homes by the first author, who has a background in clinical psychology and infant developmental psychology. About four weeks after the birth of their child, a phone call was scheduled. The aim of this phone call was to ask how parents and their child were doing, and to discuss possible problems in the implementation of the provided information in their lives. All phone calls were performed by the first author. Parents were given the opportunity to ask questions with regard to sensitive responsiveness and contact-seeking of the infant; and any issues in relation to the infant's crying, feeding, and sleeping behaviors. Parents were also given the opportunity to discuss their own well-being, such as feelings of depression, anxiety or stress. Both during the home visit and the postnatal phone call, as well as in the information booklet, we explicitly described that the birth of a child is a major life change that can evoke different emotions and that adapting to the new situation takes time. We also explained that many parents can feel tired, sad or frustrated during the first months after birth. We encouraged parents to discuss their emotions and needs with their partner, and to seek additional support from their social network or support services when needed.

Waitlist control group

Parents randomized to the waitlist control group received the psychoeducational materials after they had completed the last assessment, about 10 weeks after the birth of their child. The information was still applicable for them at that time. Also, they were given the opportunity to schedule a phone call to discuss the materials. None of the parents from the control group made use of the possibility for a phone call. All parents in the study, both in the intervention and control group, had access to care-as-usual (e.g. visits to the well-baby clinic, general practitioner) during the pre- and postpartum period.

Measures

Online questionnaires were sent to both the mother and the father. The questionnaires assessed the primary outcome (parenting stress), as well as the other indicators of distress (symptoms of depression and anxiety) and parental well-being (satisfaction with the parenting role, parenting self-efficacy, and sleep quality and quantity). Furthermore, we measured quality of caregiving, including parent-infant bonding, duration of exclusive breastfeeding, duration of room-sharing (the infant sleeping in the parents' room on a separate surface) and parental perception of problems with infant crying, feeding, and sleeping. We also assessed potential confounders, namely: characteristics of the delivery and birth, attachment styles of the parents, and marital satisfaction. Finally, we measured the uptake of the intervention.

Parental distress

Parenting stress was assessed with 10 items of the Parenting Stress Index (PSI; Abidin, 1983; De Brock, Vermulst, Gerris, & Abidin, 1992). Since the PSI has been originally developed for parents of children up to 14 years (De Brock et al., 1992), we selected the 10 items that are most relevant for parents of a newborn child and added one item because it was considered central to the parenting stress construct (especially for parents of a newborn): “The responsibility I have for my children weighs on me” (see also Missler, Stroebe, & Van der Laan, 2014). An example of the other items is: “I feel restricted by my responsibilities as a parent.” Response options varied from 1 (totally disagree) to 6 (totally agree). A total score is derived by summing the individual item scores ranging from 11 (no stress) to 66 (very high stress). For mothers, Cronbach’s alpha in the current study was .63 (T0), .67 (T1), .73 (T3), and .75 (T4). For partners, Cronbach’s alpha was .75 (T0), .73 (T1), .75 (T3), and .84 (T4).

Depressive symptoms were assessed with the Edinburgh Postnatal Depression Scale (Cox, Holden, & Sagovsky, 1987; Dutch translation Pop, Komproe, & Van Son, 1992). This scale consists of 10 items. Participants could indicate the experienced frequency of each depression-related statement on a 4-point scale. Items are scored from 0 to 3 and the total score ranges from 0 (no depressed feelings) to 30 (severely depressed feelings). The scale shows good psychometric properties: Pop et al. (1992) reported a Cronbach’s alpha of .82 and sufficient concurrent validity. Cronbach’s alpha in the current study ranged from .77 (T1) to .85 (T3) for mothers, and from .71 (T0) to .83 (T4) for partners. EPDS cut-off scores were subsequently used for descriptive purposes. To screen for (minor) depression and describe depression symptomatology in the general population, a cut-off score of 10 or more was used,

as previously recommended (Cox et al., 1987; Bergink et al., 2011). As it has been suggested that men are emotionally less expressive compared to women (Matthey et al., 2006), the procedure was followed as reported by Leung, Letourneau, Giesbrecht, Ntanda, and Heart (2017), and a slightly lower cut-off score was used for fathers (EPDS score of 9 or more). To be consistent and for sake of clarity, the same cut-off scores for both mothers and fathers were used in the prenatal and the postnatal period (i.e. 10 or more for mothers and 9 or more for fathers).

Anxiety symptoms were measured with the anxiety subscale of the Hospital Anxiety and Depression Scale (HADS; Olsson, Mykletun, & Dahl, 2005; Dutch translation Spinhoven, Ormel, Sloekers, Kempen, Speckens, & Van Hemert (1997). This subscale consists of seven items. For each item, participants could indicate their level of experienced anxiety on a 4-point scale. Total scores range from 0 (no anxiety) to 21 (severe anxiety). Spinhoven et al. (1997) reported good psychometric properties for the Dutch version. In the current study, Cronbach's alpha ranged from .64 (T1) to .71 (T4) for mothers, and from .73 (T0) to .76 (T1) for partners. A cut-off score of 8 or more was used to identify anxiety symptomatology within the clinical range (Bjelland et al., 2002).

Parental well-being

Satisfaction with the parental role was measured with three items of the Dutch translation of the Parenting Stress Index (PSI; Loyd & Abidin, 1985; De Brock et al., 1992). As has been done before, four items were added to the scale (see Missler et al. 2014; 2018). The addition of these items was necessary because to our knowledge, no measure of parents' satisfaction with their new role currently exists. An example item is: "I enjoy spending time with my child." Cronbach's alpha in this study ranged from .64 (t0) to .76 (t3) for mothers, and from .77 (t4) to .89 (t1) for partners.

Self-efficacy was assessed with 1 item, through which parents could indicate their (expected) efficacy as a parent on a 5-point scale, ranging from 1 (not very good) to 5 (a very good parent (Cook, Bayer, Le, Mensah, Cann, & Hiscock, 2012; Hiscock et al., 2014).

Perception of sleep quality and quantity were measured with two items of the Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989; see also Cook et al., 2012). The items were phrased as follows: 'Over the last 2 weeks, how would you rate your own sleep quality/sleep quantity?'. Parents could indicate their experienced sleep quality on a 4-point scale, varying from 'Not nearly good enough' to 'More than good enough'. Because of high correlations between quality and quantity at T3 ($r=.61$, $p<.05$), and at T4 ($r=.67$, $p<.05$), and our desire to reduce

the number of analyses, sleep quality and quantity scores were standardized and subsequently averaged across the two time points.

Quality of caregiving

Bonding between parent and child was measured with the Maternal Postnatal Attachment Scale (MPAS; Condon & Corkindale, 1998; Van Bussel, Spitz, & Demyttenaere, 2010). This scale consists of 19 statements, for example: "When I am with the baby, I feel tense and fearful." Parents could indicate how much they agreed with each statement on a 2-point; 4-point; or 5-point scale. By summing up all items, a total score between 19 and 95 can be reached. Lower scores are an indication of bonding problems between parent and child. When administered between two and three months after birth, Van Bussel et al (2010) reported a Cronbach's alpha of .75. In the current study, Cronbach's alpha was .81 for mothers (T4) and .86 (T4) for partners.

Breastfeeding. The duration of exclusive breastfeeding was assessed by asking mothers to indicate the number of weeks their child received exclusive breastfeeding, and thus no formula.

Room-sharing. Mothers were asked to indicate the number of weeks of room-sharing, defined as the infant sleeping in the room of the parents at night (in a separate cot or in the bed of the parents).

Perception of problems with infant sleeping, crying, feeding. Additionally, both mothers and fathers were asked in the online questionnaire (t3 and t4) whether they had experienced a problem with infant sleeping, crying, or feeding (at day and/or at night). If they responded affirmatively, they were asked to indicate the severity of this problem on a 7-point Likert scale. Response options varied from 1 (hardly any problem) to 7 (a severe problem) (see also Hiscock et al., 2014).

Control variables

We included the following potentially confounding variables and tested for between-group differences on these variables. In case of non-significant results, we did not include the variable in our main analyses.

Birth characteristics. Characteristics of the delivery and birth were assessed by parents' self-report and included birth weight, Apgar score at 5 minutes, and spontaneous delivery versus caesarean section.

Attachment style of the parents. To control for possible insecure attachment styles of the parents (which can impact on their caregiving quality; Edelstein et al., 2004; Jones, Cassidy, & Shaver, 2015), parental attachment style was measured with the short form of the Experiences in Close Relationships Questionnaire (ECR- short form; Lafontaine, Brassard, Lussier, Valois, Shaver, & Johnson, 2016; Dutch translation Conradi, Gerlsma, Van Duijn, & De Jonge, 2006). The 12 items of this instrument are derived from the avoidance and anxious attachment subscales of the ECR-R (six items of each subscale; Brennan, Clark, & Shaver, 1998). Response options vary from 1 (strongly disagree) to 7 (strongly agree). The avoidance subscale measures the need to stay independent from others and to avoid intimacy (Lafontaine et al. 2016, see also Bartholomew & Horowitz, 1991). The anxiety subscale measures the degree to which the subject worries about rejection and abandonment (Bartholomew & Horowitz, 1991, Lafontaine et al., 2016). Following recoding of items 15, 25, 27, 29, and 31; for each subscale (anxiety and avoidance) an average score of between 1 and 7 can be computed. Higher scores reflect more attachment anxiety and avoidance. The ECR-short form showed good psychometric properties in different samples: Lafontaine et al. (2006) reported Cronbach's alphas of .78 to .87 for the anxiety subscale and .74 to .83 for the avoidance subscale. In the current study, for mothers, Cronbach's alpha was .76 for the anxiety subscale and .85 for the avoidance subscale. For partners, these values were .76 (anxiety) and .85 (avoidance).

Marital satisfaction. Participants' satisfaction with their relationship was measured with the global satisfaction items of The Investment Model Scale (IMS; Rusbult, Martz, & Agnew, 1998; Dutch translation: Montgomery, Peeters, Schaufeli, and Panagopoulou, 2008). This scale consists of five items, with answering options varying from 1 (totally disagree) to 9 (totally agree). An example item is: "My relationships fulfills my needs for intimacy." The total score ranges from 5 (not satisfied) to 45 (very satisfied). Montgomery et al. (2008), reported a Cronbach's alpha of .93.

Intervention uptake and satisfaction. The uptake of the intervention was measured by asking parents whether they had read and watched the materials before the birth of their child. We also asked them whether they looked into the materials again after the birth of their child. Furthermore, we asked them to rate the frequency of using the information in their daily lives, with the item: "How many times did you use the information from the booklet, video, or the home visit during the daily care for your baby?" Response options were: "Daily"; "Several times a week"; "About once a week"; "About once every 2 weeks"; "About once a month"; and "Never." We also asked them to rate the usefulness of the booklet, video, and the home visit on a 5-point scale ranging from 1 "Not very useful" to 5 "Very useful."

Statistical Analyses

Preliminary analyses

We investigated the effect of the intervention on all different outcomes. First, we inspected distress scores over time for men and women separately (Tables 2 and 3). We analyzed whether there were between-group differences at the follow-up (T3) and final assessments (T4) for all distress (parenting stress, depression, anxiety), well-being (self-efficacy, satisfaction with the parenting role) and quality of caregiving outcomes (bonding, duration of breastfeeding, duration of room-sharing, perception of infant problems).

Because of high intercorrelations, scores at T0 and T1 were averaged for parenting stress (r = .75; p < .01 and r = .77; p < .01 for partners), depression (r = .66 for mothers and .62 for partners; p < .01), anxiety (r = .58 for mothers and .70 for partners; p < .01), satisfaction with the parenting role (r = .45 for mothers and .38 for partners; p < .01), and self-efficacy (r = .61 for mothers and .58 for partners; p < .01).

Main analyses

To deal with the nested nature of the data (mothers and fathers in couples), we used multilevel linear modelling (MLM). MLM is robust for missing data and is unaffected by unequal number of data points per unit, in this case the mother-father dyad (Tabachnik & Fidell, 2007). Therefore, there was no need to control for the fact that more mothers than fathers participated. We could run the analyses on the full data set, including data from participants with incomplete data. As we hypothesized that parenting stress and parental mental problems would be highest around 6 weeks of infant age (i.e. the infant crying peak; Barr, 1990) analyses were focused on the outcomes at T3. To test the robustness of the results, we repeated all analyses for T4.

MLM is based on a set of regression equations. First, the intercepts-only model (a model without predictors) was ran to check whether a multilevel model was required, by means of the intraclass correlation. The intraclass correlations ranged between .20 and .40, thus MLM analyses were appropriate for all variables. Second, following Tabachnik and Fidell (2007), a build-up strategy was used. Variables were added one by one to the intercept-only model. After each addition, the −2 log likelihood ratio scale after generalized least square estimation was examined. The −2 log likelihood

tracks model fit. If model fitness increases, the added variable is kept. If model fitness decreases, the added variable is cut from the model.

The variables were tested in a certain order. First, gender (mother or father) was included as a fixed factor, and then as a random factor. Thereafter, intervention condition was added. Finally, interaction terms between intervention X parental gender, and between intervention X prenatal state (including the main effect of prenatal state) were added. These interaction terms tested whether intervention effects differed between mothers and fathers, and between parents varying on prenatal levels of the outcome of interest (e.g. whether the intervention was effective in decreasing postpartum parenting stress symptoms depending on their levels of prenatal parenting stress). Also, the interaction between intervention X parity was of interest to investigate whether the intervention was effective for first-time parents versus experienced parents (i.e. parents with children). As the majority of our sample (91.2%) consisted of first-time parents, multilevel analyses were repeated in the sample with first-time parents only. The final models are presented in the results. All analyses were done using SPSS 25.0.0.

Results

Descriptives

We included 138 women (68 in the intervention group and 69 in the control group) and 96 partners (48 in the intervention and 48 in the control group). Figure 1 shows the CONSORT flow diagram. The response rate of the mothers was high: 88.3% (T1); 89.7% (T2), 84.7% (T3) and 87.6% (T4). Non-response was mainly caused by medical complications during pregnancy or birth (Figure 1). For partners, the response rate was also high: 88.4% (T1), 100%[1] (T2); 74.7% (T3) and 85.2% (T4).

The mothers were on average between 32 and 33 years of age (Table 1). Partners were slightly older, with a mean age of about 35 years. The majority of the mothers (94.8%) were either married or cohabitating. Most participants received higher vocational education and about one third (34.7%) of mothers worked fulltime at baseline (during pregnancy). More than half of the participants reported a net family income of more than 4000 euros per month. The majority (91.2%) of participating mothers

[1] At t2, one questionnaire measuring delivery characteristics was sent to both parents. One of the parents could fill in this questionnaire. For all participating fathers, a questionnaire was returned at t2 (but not necessarily filled in by the father).

was pregnant of their first child. No significant differences between the intervention and control group emerged on the demographic variables.

Table 1. *Demographics and confounder variables*

	Mothers			Partners		
	Intervention group (n=68)	Control group (n=69)	p-value	Intervention group (n=45)	Control Group (n=44)	p-value
Age (mean, SD)	32.69 (3.37)	32.23 (3.54)	0.44	35.03 (4.08)	34.73 (5.67)	0.79
% married or cohabitating	94.1	95.6	0.51	95.5	97.7	0.27
% ≥ higher vocational education	91.1	91.2	0.51	86.7	77.2	0.31
Working hours (weekly)			0.13			0.13
employed ≥ 37 h (%)	28.3	39.8		57.8	72.8	
employed 21-36 h (%)	65.5	54.4		35.5	22.7	
employed 0–20 h (%)	1.5	4.4		4.4	1.5	
no paid employment	4.5	1.5		2.2	2.3	
Family income* (% ≥ €4000)	52.2	60.2	0.40	57.8	56.8	0.78
Birth order* (% 1st child)	91.2	91.3	0.96	88.9	84.1	0.45
# weeks pregnant at inclusion	28.24 (2.60)	27.81 (4.18)	0.45	28.20 (2.49)	27.56 (4.61)	0.39
Attachment style: avoidance	11.52 (5.82)	10.52 (3.93)	0.25	13.52 (6.54)	12.78 (5.31)	0.57
Attachment style: anxiety	16.64 (5.35)	17.24 (5.79)	0.54	17.49 (6.68)	17.44 (5.73)	0.97
Marital satisfaction	30.97 (4.39)	31.63 (3.72)	0.35	30.96 (3.87)	30.93 (3.49)	0.97
% cesarean section	9.9	11.3	0.69			
Birth weight	3484.84 (472.94)	3484.57 (424.02)	0.99			
Apgar score 5 minutes (% ≥7)	98.4	98.3	0.23			
Apgar score 5 minutes	9.43 (1.3)	9.66 (.81)				

** differences between mothers and partners because not all partners participated in the study*

Treatment adherence and drop-out

Of the 68 mothers who were allocated to the intervention group, 63 received the intervention (booklet, video, and home visit). The other mothers (*n*=5) were not able to receive the intervention because of pregnancy complications developed after inclusion (i.e. HELLP syndrome or premature birth). Two mothers dropped out of the study after the home visit because of hospital admission and chromosomal abnormality (Figure 1). In the control group, 5 women dropped out right after randomization: two because of pregnancy complications and three because they could not be contacted anymore. Two more women dropped out after T1 because they indicated they felt they were too busy to continue participation (*n*=1) or did not feel comfortable sharing personal information *(n=1)*.

Parental distress

Table 2 shows the distress scores over time for mothers. As can be seen from the mean scores, both the intervention and control group showed a rise in distress (parenting stress, depression, and anxiety) and a decrease in well-being (satisfaction with the parenting role and self-efficacy) from T0 to T3, after which distress levels returned to baseline at T4. There were no significant differences on the distress variables between the intervention and control group at 6 (T3) or 10 weeks after birth (T4).

At baseline, 5 mothers in the intervention group (3.3%) scored above the cut-off for depression (10 or more on the EPDS) and 8 mothers in the control group (12.1%). With regard to anxiety, in the intervention group, 11 mothers (16, 4%) scored 8 or more on the HADS at baseline and 14 mothers in the control group (20,6%). Ten weeks after birth (t4) 5 mothers in the intervention group (9.1%) scored above the threshold for depression, and 5 mothers in the control group (8.2%). A total of 7 mothers in the intervention group (12.7%) scored above the cut-off for anxiety (8 or more on the HADS) at t4, and 13 mothers in the control group (21.7%).

Table 2. *Stress, depression, anxiety, satisfaction, self-efficacy and bonding mean scores for mothers in intervention and control group over time (mean; standard deviation), and p-values for group differences at T3 and T4*

	T0 (26-34 weeks pregnant)	T1 (34-36 weeks pregnant)	T3 (6 weeks after birth)	T4 (10 weeks after birth)	p-value* T3	p-value* T4
Primary outcome						
Stress						
Intervention	32.97 (6.75)	32.91 (7.15)	39.03 (3.08)	32.42 (8.43)	.72	.22
Control	33.01 (6.25)	32.73 (6.92)	38.59 (3.48)	30.59 (7.57)		
Secondary outcomes						
Depression						
Intervention	4.48 (3.08)	4.44 (3.60)	5.53 (4.02)	4.82 (4.20)	.86	.59
Control	4.86 (3.83)	3.87 (2.60)	5.67 (4.40)	4.44 (3.34)		
Anxiety						
Intervention	5.10 (2.10)	5.59 (2.29)	5.69 (2.53)	5.64 (2.77)	.47	.78
Control	5.35 (2.14)	5.05 (1.93)	6.05 (2.83)	5.50 (2.56)		
Satisfaction						
Intervention	38.39 (3.52)	38.82 (3.67)	32.84 (8.61)	39.40 (2.41)	.46	.71
Control	38.32 (3.41)	38.93 (3.25)	32.31 (7.33)	39.21 (2.91)		
Parental self-efficacy						
Intervention	3.94 (.52)	4.05 (.45)	3.88 (.65)	3.98 (.53)	.68	.99
Control	3.87 (.54)	3.98 (.53)	3.83 (.70)	3.98 (.53)		
Sleep quality						
Intervention	n/a	n/a	2.41 (.70)	2.58 (.74)	.15	.68
Control	n/a	n/a	2.59 (.56)	2.73 (.61)		
Sleep quantity						
Intervention	n/a	n/a	2.41 (.70)	2.58 (.74)	.70	.23
Control	n/a	n/a	2.59 (.56)	2.73 (.61)		
Parent-infant bonding						
Intervention	n/a	n/a	n/a	66.15 (6.02)	n/a	.83
Control	n/a	n/a	n/a	66.55 (5.18)		

Table 3. *Stress, depression, anxiety, satisfaction, self-efficacy, and bonding mean scores for partners in intervention and control group over time (mean; standard deviation), and p-values for group differences at T3 and T4.*

	T0 (26-34 weeks pregnant)	T1 (34-36 weeks pregnant)	T3 (6 weeks after birth)	T4 (10 weeks after birth)	p-value T3	p-value T4
Primary outcome						
Stress						
Intervention	25.38 (6.74)	26.55 (6.58)	38.82 (3.27)	28.66 (9.66)	.61	.59
Control	24.49 (7.08)	25.67 (6.67)	38.54 (4.35)	27.36 (9.56)		
Secondary outcomes						
Depression						
Intervention	3.62 (3.20)	2.70 (3.07)	2.93 (2.62)	3.21 (3.67)	.38	.54
Control	3.93 (2.56)	3.00 (2.29)	3.66 (3.61)	3.75 (3.40)		
Anxiety						
Intervention	6.24 (3.26)	5.48 (2.86)	5.25 (2.07)	5.55 (3.11)	.73	.96
Control	5.79 (2.28)	5.86 (2.60)	5.49 (3.02)	5.58 (2.35)		
Satisfaction						
Intervention	36.76 (5.42)	36.68 (6.11)	28.61 (7.26)	38.86 (3.29)	.78	.58
Control	37.67(3.22)	37.72 (3.48)	27.60 (7.99)	38.36 (3.48)		
Self-efficacy						
Intervention	4.11 (.65)	4.22 (.62)	4.11 (.57)	4.00 (.71)	.27	.60
Control	4.02 (.56)	4.22 (.59)	3.94 (.59)	3.92 (.55)		
Sleep quality						
Intervention	n/a	n/a	2.75 (.59)	2.93 (.66)	.22	.18
Control	n/a	n/a	2.54 (.70)	2.69 (.71)		
Sleep quantity						
Intervention	n/a	n/a	2.64 (.68)	2.86 (.85)	.39	.42
Control	n/a	n/a	2.49 (.74)	2.69 (.75)		
Parent-infant bonding						
Intervention	n/a	n/a	n/a	64.46 (6.42)	n/a	.73
Control	n/a	n/a	n/a	63.78 (6.73)		

Table 3 shows the different scores over time for fathers. Also here, both groups showed a rise in distress levels and a decrease in well-being from t0 to t3, after which distress levels returned to baseline. There were no significant differences in distress between the intervention and control groups at 6 (t3) or 10 weeks after birth (t4).

At baseline, 4 fathers in the intervention group (8.9%) scored above the cut-off score for depression (9 or more on the EPDS) and 2 fathers in the control group (4.65%). With regard to anxiety, 13 fathers in the intervention group (28.9%) scored 8 or more on the HADS at baseline and 11 fathers in the control group (25,6%). Ten weeks after birth (t4), 4 fathers in the intervention group (13.8%) scored above the threshold for depression, and 5 fathers in the control group (13.9%). A total of 7 fathers in the intervention group (24.1%) scored above the cut-off for anxiety (8 or more on the HADS) compared to 7 fathers in the control group (19.4%).

Multilevel analyses

The final multilevel models are presented in Table 4. For both maternal and paternal parenting stress at t3, the multilevel analyses indicated no effect of the intervention. Similarly, the interaction terms intervention X parental gender, and intervention X prenatal state did not significantly improve model fit. The intervention was thus not effective in decreasing parenting stress. Moreover, multilevel analyses indicated no effect of the intervention on parental depressive symptoms, anxiety symptoms nor on any other parental secondary outcome (satisfaction with the parenting role, self-efficacy, and perception of sleep quality and quantity). The interaction terms were also not significant, indicating that the intervention was not effective for both mothers and fathers, or for parents varying in their prenatal levels on the outcome of interest.

Additionally, the multilevel analyses indicated that mothers had higher levels of postpartum depressive and anxiety symptoms, and worse perceptions of their sleep quality and quantity, compared to fathers. Furthermore, for all outcomes of interest, prenatal levels were predictive of postpartum levels, indicating that symptoms were to some extent stable over the course of childbirth. Repeating the multilevel analyses with the outcomes measured at infant age 10 weeks (T4), and on the sample including only first-time parents yielded similar results.

Table 4. *Estimates for the best fitting multilevel models*

	Estimate	SE	*p*
Primary outcome: parenting stress (T3)			
Intercept	14.22	3.18	<0.001
Gender (1 = mother, 2 = father)	-.41	.96	.67
Prenatal parenting stress*	.57	.07	<0.001
Deviance: 1165.48			
Secondary outcomes			
Depressive symptoms (T3)			
Intercept	4.58	.83	<0.001
Partner (1 = mother, 2 = father)	-1.69	.46	<0.001
Prenatal depressive symptoms*	.63	.09	<0.001
Deviance: 926.42			
Anxiety symptoms (T3)			
Intercept	3.26	.65	<0.001
Partner (1 = mother, 2 = father)	-.81	.36	.03
Prenatal anxiety symptoms*	.66	.08	<0.001
Deviance: 799.03			
Satisfaction with the parenting role (T3)			
Intercept	19.96	3.08	<0.001
Partner (1 = mother, 2 = father)	.30	.48	.53
Prenatal levels of satisfaction*	.48	.08	<0.001
Deviance: 911.98			
Self-efficacy (T3)			
Intercept	1.38	.36	<0.001
Partner (1 = mother, 2 = father)	.04	.09	.68
Prenatal levels of self-efficacy*	.61	.09	<0.001
Deviance: 305.34			
Perception of sleep (T3)**			
Intercept	-.40	.18	.03
Partner (1 = mother, 2 = father)	.29	.13	.02
Deviance: 458.38			
Bonding (T4)**			
Intercept	67.92	1.94	<0.001
Partner (1=mother, 2=father)	-.12	.96	.90
Deviance: 1141.44			

** = prenatal state levels are averaged across T0 and T1 because of high intercorrelations (ranging between .38 and .77)*

*** = no prenatal levels available*

Quality of caregiving

Bonding. The multilevel model for parent-infant bonding is presented in Table 4. For both maternal and paternal bonding with the infant at T3, the multilevel analyses indicated no effect of the intervention. Similarly, the interaction terms intervention X parental gender, and intervention X prenatal bonding did not significantly improve model fit. The intervention was thus not effective in improving parent-infant bonding.

Breastfeeding and room-sharing. Independent samples t-tests indicated that there were no differences between the intervention (M= 7.66, SD= 4.19) and the control group (M=7.26, SD = 4.52) with regard to the mean duration (in weeks) of exclusive breastfeeding, *p = .78* (Table 5). Also, no differences emerged in the number of weeks participants in the intervention group (M= 8.64, SD= 3.52) and in the control group (M=7.26, SD = 4.52*)* slept in the same room as their child at night (while the child was in his or her own cot) , *p = .77*.

Table 5. *Mean number of weeks of exclusive breastfeeding and the mean number of weeks the child slept in the same room as the parents (in own cot) at 10 weeks after birth (t4)**

	Intervention	Control	p-value
# weeks exclusive breastfeeding	7.66 (4.19)	7.26 (4.52)	.78
# weeks room-sharing	8.64 (3.52)	9.12 (3.28)	.77

**For room-sharing, only parents that slept with their child in the same room, while the child was in his or her own cot were taken into account (control, n* =51/ intervention, *n*=50).

Perceived problems with infant crying, feeding, and sleeping. There was one significant difference with regard to perceived problems with infant crying, feeding, or sleeping: 16.2% of mothers in the intervention group reported problems with infant feeding during daytime at 6 weeks after birth, versus 6.9 % in the control group; *p = .05*). No other differences between the intervention and the control groups emerged in the percentage of mothers reporting problems with the infant's sleeping,

crying, or feeding (assessed separately for day- vs. night-time) at 6 weeks after birth (T3) nor at 10 weeks after birth (T4; Table 6).

Table 6. *Percentage of mothers reporting problems with the infant's sleep, crying or feeding.*

	Intervention T3 (6 weeks after birth) % reporting problem	Control T3 (6 weeks after birth) % reporting problem	p-value T3	Intervention T4 (10 weeks after birth) % reporting problem	Control T4 (10 weeks after birth) % reporting problem	p-value T4
Infant sleep (night)	29.3	32.8	.69	14.5	15.0	.95
Infant sleep (day)	50.0	36.8	.13	34.5	35.0	.96
Infant crying (night)	15.5	11.6	.79	5.5	3.3	.58
Infant crying (day)	31.0	34.5	.69	27.3	21.7	.48
Infant feeding (night)	13.8	5.2	.11	3.6	6.7	.47
Infant feeding (day)	16.2	6.9	.05*	16.4	10.0	.31

Intervention uptake and satisfaction. Almost all mothers (98.5%) read the information booklet and watched the video before the birth of their child. For partners, these percentages were 85.7% (information booklet) and 92.9% (video). More than half of the mothers (55.6%) and about one third of the partners (32.1%) reported to have used the information after the birth of their child daily or several times a week. Moreover, participants reported the intervention to be useful. Both mothers and fathers found the information booklet the most useful part of the intervention (Table 7). The home visit and the video were rated as partly useful by both parents.

Table 7. *Means and standard deviations of intervention usefulness as reported by mothers and fathers (as indicated on a 1-5 Likert scale).*

	Mothers	Partners
Information booklet	4.15 (.87)	3.64 (.91)
Video	3.08 (1.00)	2.71 (1.05)
Home visit	3.11 (.93)	2.96 (.92)

Discussion

The aim of this randomized controlled trial was to examine the effectiveness of a brief psychoeducational intervention to prevent postpartum parenting stress, to decrease symptoms of depression and anxiety, and to enhance parental well-being and the quality of caregiving behavior. The intervention was aimed at a universal population of parents (regardless of risk factors or (previous) symptoms), and the intervention was targeted at both parents. For both groups, there was a rise in distress scores between baseline and 6 weeks postpartum. No differences emerged in levels of parenting stress between the intervention and control group over time. This means that parents that received and digested the information and were visited at home during pregnancy did not report lower levels of parenting stress compared to parents that did not receive this support. Also, there was no effect of the intervention on symptoms of depression and anxiety, nor on the indices of parental well-being (satisfaction with the parenting role, self-efficacy, and sleep quality and quantity). With regard to quality of caregiving, no differences emerged in the quality of the parent-infant bond, nor in the duration infants received breastfeeding or slept in the parent's room at night-time. Parents from the intervention group did not report *less* problems with their infant's crying, feeding, or sleeping. In contrast, mothers from the intervention group reported *more* instead of less problems with infant feeding at 6 weeks postpartum than mothers from the control group.

While psycho-education has been indicated valuable in reducing symptoms of psychological distress (Donker et al., 2009), also when implemented during pregnancy (Missler et al. submitted), visiting upcoming parents at home and providing them with information about adapting to the parental role, and infant crying, feeding, and sleeping (arrangements) seemed not to be effective in preventing postpartum distress and enhancing caregiving quality. However, the intervention seemed to fill a gap in the information and tools that are currently available for parents-to-be. Parents rated the intervention as useful and of added value. The question arises how an intervention that is rated as useful, particularly by the mothers, did not result in any changes in our dependent variables. Several factors could have played a role here. First, it could be that the effect of the intervention becomes visible later on during the first year (i.e. after the initial 10 weeks). Second, it is possible that the intervention is effective on other measures that we did not take into account in this study (e.g. observed sensitive responsiveness; infant well-being). Third, the intervention might be more effective for specific groups of parents (i.e. our sample was relatively well-educated, reporting high SES). Also,

we lack information on participants psychosocial history. Finally, it is possible that the intervention has no added value. We will review each of these possibilities below.

First, we followed parents until 10 weeks after birth. We expected parental distress levels to be highest within these first 10 weeks, because infant crying rises until 6 weeks and gradually decreases thereafter (Barr, 1990). Indeed, in both groups, distress scores over time showed a peak at 6 weeks, and returned to baseline at 10 weeks after birth. It could be that the tools we provided parents with have a buffering effect on other peaks of parental distress during the first year. This reasoning is in line with Hiscock et al. (2014) who found an effect of their psychoeducational intervention implemented shortly after birth on primary caregiver's (in 99.6% of cases the mother) depressive symptoms at 6, but not at 4 months postpartum. Moreover, effects of the intervention on breastfeeding and room-sharing might also become visible later in the first year of life. While not leading to group differences during the first weeks postpartum, when many parents are breastfeeding and room-sharing, differences in total breastfeeding and room-sharing duration might become visible after this period. Future studies into universal prevention during pregnancy should consider to extend the study period to examine whether effects of interventions emerge later in the first year of the infant's life.

Second, it is possible that the intervention was not effective in decreasing parental distress or increasing caregiving quality measures but impacted other measures such as observed parental caregiving quality, parental stress physiology, or infant behavior. Given that mothers from the intervention group reported more problems with infant feeding, it is possible that the intervention increased maternal awareness for potential problems, making them more prone to report these. However, no differences emerged with regard to crying and sleeping. Measuring parent-infant interaction at various moments during the first year would shed more light on whether the intervention supports parents in developing these skills. Also, our study relied heavily on self-report measures, which are known for their problems with social desirability (Morsbach & Prinz, 2006). Parental physiological stress measures, such as cortisol measurements in hair, could give insight in parental stress physiology. Also, direct measures of infant behavior should be added, such as a registration of infant crying patterns, to monitor potential effects of the intervention on infant behavior (Barr, Kramer, Boisjoly, McVey-White, & Pless, 1988).

Third, our sample mainly consisted of relatively highly educated first-time parents. These parents are more likely to seek and find information about pregnancy and childrearing themselves. It is possible that less educated parents have less resources to find the necessary information and would benefit more when this information would be consequently provided by midwives and nurses, for example through a clear and brief information booklet as provided in the current study. However, as

Henshaw et al (2018) showed among a sample of parents varying in income, education, and ethnicity; having access to much information does not necessarily reduce stress. There is especially a need for reliable and evidence-based information (Young, Roberts, and Ward, 2020). Therefore, we aimed to provide parents with up to date and scientifically validated information about the first months postpartum, and intervention effects were expected also among highly educated parents.

Related to the previous point is that we have no information about the participants psychosocial history, while it is possible that the intervention is (only) effective for parents with a history of psychosocial problems. In future research, psychosocial history should be added as a moderator of intervention effectiveness. Other risk factors that have been shown to moderate postpartum distress symptomatology could also determine intervention effectiveness, for example delivery complications (Field, 2018), and relational problems (Tissera, Auger, Séguin, Kramer, & Lydon, 2020). In sum, it could be that a more mixed sample of parents, including less highly educated parents, as well as a sample of parents varying in risk factors, would generate different results. On a related note, while there were no between-group differences, gender differences emerged with regard to depression, anxiety, and sleep at 6 weeks postpartum. Mothers reported higher levels of symptomatology than fathers. This is in line with earlier research (Kivuruusu et al., 2020, Gay, Lee, & Lee, 2004). Previous research into depression suggested that the rise in symptomatology fathers experience after birth takes place later in the first year and develops more slowly than is the case for mothers (Kiviruusu et al. 2020). Future studies following parents longitudinally could shed more light on whether mothers and fathers need different types of support, and/or at different times during the perinatal period.

Finally, while absence of evidence is not evidence of absence, we should also acknowledge the possibility that a brief psychoeducational intervention aimed at providing information is not sufficient to influence parents' levels of distress and their caregiving quality. It might be that interventions incorporating more sessions, as well as state-of-the-art therapeutic elements, are needed to prevent parents from developing symptomatology. For example, Haga, Drozd, Lisoy, Wentzel-Larsen, and Slining (2019) reported an effect on depressive symptoms of an online intervention among a universal population of pregnant women at 6 weeks postpartum. This extensive intervention consisted of 44 online 10-minute sessions and incorporated a mix of elements of cognitive-behavioural therapy, mindfulness, psychoeducation, meta-cognitive therapy, acceptance and commitment therapy, and positive psychology. Thus, this intervention differed from ours with regard to the content (psychoeducation combined with elements of a range of therapeutic techniques); the relatively high frequency of (short) sessions, and the fact that all sessions could be followed online. These factors could explain why the intervention was successful in reducing depressive symptoms, at least during the first weeks after birth.

Strengths and Limitations

This randomized controlled trial has several strengths. First, while most studies focusing on the prevention of psychopathology after birth included mothers who already displayed symptomatology (indicated prevention; Bittner et al., 2014; Austin et al., 2008) or on mothers belonging to risk groups for developing postpartum psychopathology (selected prevention; Bayrampour et al., 2018; Dennis et al., 2017; Doyle et al., 2017), in this study a universally applicable intervention was tested. In contrast to indicated or selected prevention, much less is known about the effectiveness of universal prevention during pregnancy (Evans et al., 2018; Sockol, 2018). Second, while the majority of previous intervention focused on mothers only, we were able to include mothers as well as a substantial part of fathers. Third, while most prevention studies focused on depression as an outcome measure (Evans et al., 2018; Sockol, 2018), we included a variety of distress outcomes, including stress related to the parenting role and symptoms of anxiety.

Of course, the study has limitations as well. First, while we aimed to include a sample of expecting parents varying in demographic characteristics and backgrounds, our sample was relatively well-educated, and reported a relatively high income. This decreases the generalizability of this study. Notably, to be able to digest the information booklet and the video, parents needed to be able to read Dutch and have access to the internet. Since 98% of Dutch households have access to the internet at home (Statistics Netherlands, 2018), we assume that this criterion has not lead to the exclusion of lower educated parents. Instead, it seems more likely that higher SES parents actively search for and make use of this type of interventions. Indeed, a study investigating predictors of eHealth usage found that people with a lower socio-economic status were less likely to engage in a number of eHealth activities compared to their counterparts with higher socio-economic status (Kontos Blake, Chou, & Prestin, 2014). It is important that future studies assess the reasons for these differences in the implementation of eHealth and online interventions, because these differences can contribute to persistent disparities in health across social groups (Kontos et al., 2014). Second, we were only able to measure until 10 weeks after birth. While we captured the first stressful weeks after birth including the infant crying peak, it could be that potential effects on parental distress levels or our measures of caregiving quality, including breastfeeding and room-sharing, become visible later on during the first year. Third, we did not measure parental use of external support services, including the use and quality of external breastfeeding courses and support services. It might be that, as a result of the intervention, parents used these support services more often, or that differences in our outcome variables only become visible among groups of parents who have limited access to (high-quality) support services.

Fourth, as stated earlier, it could also be that the intervention did not impact on parental distress, but on other measures we could not take into account in this study. Observations and physiological measurements of both parental and infant behavior could provide more fine-grained information about the potential effect of the intervention.

Conclusion

The current study offered no evidence that a universal prevention program implemented during pregnancy, and aimed at both mothers and fathers, is effective in preventing symptoms of parenting stress, depression, or anxiety during the first 10 weeks after birth. Also, we found no evidence that the intervention enhanced the quality of parental caregiving. However, parents reported the intervention, especially the information booklet, to be of added value. Future research should detect whether this type of brief psychoeducation might be effective on other measures, samples or periods in time. While absence of evidence is not evidence of absence, it is also possible that a brief psychoeducational intervention aimed at providing information is not sufficient to improve parental well-being and caregiving quality, and other, more intensive, types of interventions are needed. Since parental distress symptomatology and parental caregiving quality after birth can affect infant development (Goodman et al., 2011; Murray et al., 2015; Stein et al., 2014), detecting effective ways of intervening in an early stage -thus already during pregnancy- is of vital importance for both parent's as well as children's health and development.

References

Abidin, R. (1983). Parenting stress index: manual. Charlottesville, VA: Pediatric Psychology Press.

Austin, M.P., Frilingos, M., Lumley, J., Hadzi-Pavlovic, D., Roncolato, W., Acland, S., Saint, K., Segal, N., & Parker, G. (2008). Brief antenatal cognitive behaviour therapy group intervention for the prevention of postnatal depression and anxiety: A randomised controlled trial. *Journal of Affective Disorders*, *105*, 35-44. https://doi.org/10.1016/j.jad.2007.04.001

Baddock, A., Purnell, M.T., Blair, P.S., Pease, A.S., Elder, D.E., & Galland, B.C. (2019). The influence of bed-sharing on infant physiology, breastfeeding, and behaviour: A systematic review. *Sleep Medicine Reviews*, *43*,106-117. https://doi.org/10.1016/j.smrv.2018.10.007

Bakermans-Kranenburg, M.J., Van IJzendoorn, M.H., & Juffer, F. (2003). Less is more: meta-analyses of sensitivity and attachment interventions in early childhood. *Psychological Bulletin*, *129*, 195-215. https://doi.org/10.1037/0033-2909.129.2.195

Ball, H.L. (2003). Breastfeeding, bed-sharing, and infant sleep. *Birth*, *30*, 181-188. https://doi.org/10.1046/j.1523-536X.2003.00243.x

Barr, R.G., Kramer, M.S., Boisjoly, C., McVey-White, L., & Pless, I.B. (1988). Parental diary of infant cry and fuss behavior. *Archives of Disease in Childhood*, *63*, 380-387. http://dx.doi.org/10.1136/adc.63.4.380

Barr, R.G. (1990). The normal crying curve: what do we really know? *Developmental Medicine & Child Neurology*, *32*, 356–362. https://doi.org/10.1111/j.1469-8749.1990.tb16949.x

Bartholomew, K., & Horowitz, L.M. (1991). Attachment styles among young adults: a test of a four category model. *Journal of Personality and Social Psychology*, *61*, 226-244.

Bayrampour, H., Vinturache, A., Hetherington, E., Lorenzetti, D.L., & Tough, S. (2018). Risk factors for antenatal anxiety: A systematic review of the literature. *Journal of Reproductive and Infant Psychology*, *36*, 476-503. https://doi.org/10.1080/02646838.2018.1492097

Beijers, R.J., Riksen-Walraven, M., & De Weerth, C. (2013). Cortisol regulation in 12-month-old human infants: associations with the infant's early history of breastfeeding and co-sleeping. *Stress*, *16*, 267-277. https://doi.org/10.3109/10253890.2012.742057

Beijers, R., Cassidy, J., Lustermans, H., & De Weerth, C. (2019). Parent-infant room-sharing during the first months of life: longitudinal links with behavior during childhood. *Child Development*, *90*, 1350-1368. https://doi.org/10.1111/cdev.13146

Bergink, V., Kooistra, L., Lambregtse-van den Berg, M.P., Wijnen, H., Bunevicius, R., Van Baar, A., & Pop, V. (2011). Validation of the Edinburgh Depression Scale during pregnancy. *Journal of Psychosomatic Research*, *70*, 385-389. https://doi.org/10.1016/j.jpsychores.2010.07.008.

Bittner, A., Peukert, J., Zimmerman, C., Junge-Hoffmeister, J., Parker, L.S., Stöbel-Richter, Y., & Weidner, K. (2014). Early intervention in pregnant women with elevated anxiety and depressive symptoms. Efficacy of a cognitive-behavioural program. *Journal of Perinatal & Neonatal Nursing*, *28*, 185-195. https://doi.org/10.1097/JPN.0000000000000027

Bjelland, I., Dahl, A.A., Haug, T.T., & Neckelmann, D. (2002). The validity of the Hospital Anxiety and Depression Scale: An updated literature review. Journal of Psychosomatic Research, 52, 69-77. https://doi.org/10.1016/S0022-3999(01)00296-3

Brennan, K.A., Clark, C., & Shaver, P.R. (1998). Self-report measurement of adult attachment: an integrative overview. In J.A. Simpson & W.S. Rholes (Eds.), Attachment and close relationships (p.46-76). New York: Guilford Press.

Brennan, P. A., Hammen, C., Andersen, M. J., Bor, W., Najman, J. M., & Williams, G. M. (2000). Chronicity, severity, and timing of maternal depressive symptoms: Relationships with child outcomes at age 5. *Developmental Psychology, 36*, 759–766. https://doi.org/10.1037/0012-1649.36.6.759

Buysse, D.J., Reynolds, C.F., Monk, T.H., Berman, S.R., & Kupfer, D.J. (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Research*, *28*, 193-213. https://doi.org/10.1016/0165-1781(89)90047-4.

Castro Dias, C., & Figueiredo, B. (2014). Breastfeeding and depression: a systematic review of the literature. *Journal of Affective Disorders*, *171*, 142-154. https://doi.org/10.1016/j.jad.2014.09.022

Clatworthy, J. (2012). The effectiveness of antenatal interventions to prevent postnatal depression in high-risk women. *Journal of Affective Disorders*, *137*, 25-34. https://doi.org/10.1016/j.jad.2011.02.029

Condon, J.T., & Corkindale, C.J. (1998). The assessment of parent-to-infant attachment: Development of a self-report questionnaire. *Journal of Reproductive and Infant Psychology*, *16*, 57-76.

Conradi, H.J., Gerlsma, C., Van Duijn, M., & De Jonge, P. (2006). Internal and external validity of the experiences in close relationships questionnaire in an American and two Dutch samples. *The European Journal of Psychiatry*, *20*, 258- 69.

Cook, F., Bayer, J., Le, H.N.D., Mensah, F., Cann, W., & Hiscock, H. (2012). Baby business: a randomized controlled trial of a universal parenting program that aims to prevent early infant sleep and cry problems and associated parental depression. BMC Pediatrics, 12, 13. https://doi.org/10.1186/1471-2431-12-13

Cox, J.L., Holden, J.M., & Sagovsky, R. (1987). Detection of postnatal depression: development of the 10-item Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry*, *150*, 782–790.

Crnic, K.A., Gaze, C. and Hoffman, C. (2005). Cumulative parenting stress across the preschool period: relations to maternal parenting and child behaviour at age 5. *Infant and Child Development*, *14*, 117-132. http://dx.doi.org/10.1002/icd.384

De Brock, A.J.L.L., Vermulst, A.A., & Gerris, J.R.A. (1992). Nijmeegse ouderlijke stress index: meetinstrument voor de vaststelling van stress bij opvoeders. Lisse, The Netherlands: Swets & Zeitlinger.

De Cock, E.S.A., Henrichs, J., Vreeswijk, C.M.J.M., Maas, A.J.B.M., Rijk, C.H.A.M., & Van Bakel, H.J.A. (2016). Continuous feelings of love? The parental bond from pregnancy to toddlerhood. *Journal of Family Psychology*, *30*, 125–134. https://doi.org/10.1037/fam0000138

De Cock, E.S., Henrichs, J., Klimstra, T.A., Maas, A.J.B.M., Vreeswijk, C.M.J.M., Meeus, W.H.J., & Van Bakel, H.J.A. (2017). Longitudinal associations between parental bonding, parenting stress, and executive functioning in toddlerhood. *Journal of Child and Family Studies*, *26***,** 1723–1733. https://doi.org/10.1007/s10826-017-0679-7

Dennis, C., Falah-Hassani, K., & Shiri, R. (2017). Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis. *The British Journal of Psychiatry*, *210*, 315-323. https://doi.org/10.1192/bjp.bp.116.187179

De Wolff, M.S., & Van IJzendoorn, M.H. (1997). Sensitivity and attachment: a meta-analysis on parental antecedents of infant attachment. *Child Development*, *68*, 571-591. https://doi.org/10.1111/j.1467-8624.1997.tb04218.x

Doyle, O., Delaney, L., O'Farrelly, C., Fitzpatrick, N., Daly, M. (2017). Can early intervention improve maternal well-being? Evidence from a randomized controlled trial. *Plos One*, *12*. https://doi.org/10.1371/journal.pone.0169829

Donker, T., Griffiths, K.M., Cuijpers, P., & Christensen, H. (2009). Psychoeducation for anxiety, depression, and psychological distress: a meta-analysis. *BMC Medicine*, *7*, 79. https://doi.org/10.1186/1741-7015-7-79

Edelstein, R.S., Weede, A.K., Shaver, P.R., Schaaf, J.M., Quas, J.A., Lovas, G.S., & Goodman, G.S. (2004). Adult attachment style and parental responsiveness during a stressful event. *Attachment & Human Development*, *6*: 31–52. https://doi.org/10.1080/14616730310000165958 4

Evans K, Morrell, C.J., & Spiby, H. (2018). Systematic review and meta-analysis of non-pharmalogical interventions to reduce the symptoms of mild to moderate anxiety in pregnant women. *Journal of Advanced Nursing*, *74*, 289-309. https://doi.org/10.1111/jan.13456

Fearon, R.P., Bakermans-Kranenburg, M.J., Van IJzendoorn, M.H., Lapsley, A.-M. and Roisman, G.I. (2010), The Significance of Insecure Attachment and Disorganization in the Development of Children's Externalizing Behavior: A Meta-Analytic Study. Child Development, 81, 435-456. https://doi.org/10.1111/j.1467-8624.2009.01405.x

Feldman, R., Eidelman, A.I. and Rotenberg, N. (2004). Parenting stress, infant emotion regulation, maternal sensitivity, and the cognitive development of triplets: A model for parent and child influences in a unique ecology. *Child Development*, *75*, 1774-1791. https://doi.org/10.1111/j.1467-8624.2004.00816.x

Field, T. (2018). Postnatal anxiety prevalence, predictors, and effects on development: a narrative review. *Infant Behavior and Development*, *51*, 24-32. https://doi.org/10.1016/j.infbeh.2018.02.005

Glasheen C, Richardson GA, Fabio A. (2010). A systematic review of the effects of postnatal maternal anxiety on children. *Archives of Women's Mental Health*, *13*, 61-74. https://doi.org/10.1007/s00737-009-0109-y

Goodman, S.H., Rouse, M.H., Connell, A.M., Robbins Broth, M., Hall, C.M., & Heyward, D. (2011). Maternal depression and child psychopathology: A meta-analytic review. *Clinical Child Family Psychology Review*, *14*, 1-27.

Groh, A.M., Roisman GI, IJzendoorn MH, Bakermans-Kranenburg MJ, Fearon RP. (2012). The significance of insecure and disorganized attachment for children's internalizing symptoms: a meta-analytic study. *Child Development*, *83*, 591–610. https://doi.org/10.1111/j.1467-8624.2011.01711.x

Haga, S.M., Drozd, F., Lisoy, C., Wentzel-Larsen, T., Slining, K. (2019). Mamma Mia – A randomized controlled trial of an internet-based intervention for perinatal depression. *Psychological Medicine*, *49*, 1850-1858. https://doi.org/10.1017/S0033291718002544

Hechler, C., Beijers, R., Riksen-Walraven, M., & De Weerth, C. (2019). Prenatal predictors of postnatal quality of caregiving behavior in mothers and fathers. *Parenting*, *19*, 101-119, https://doi.org/10.1080/15295192.2019.1556010

Henshaw, E.J., Cooper, M.A., Jaramillo, M., Lamp, M.N., Jones, A.L., & Wood, T.L. (2018). "Trying to figure out if you are doing things right, and where to get the info": Parents recall information and support needed during the first 6 weeks postpartum. *Maternal and Child Health Journal*, *22*, 1668-1675. https://doi.org/10.1007/s10995-018-2565-3

Heron, J., O'Connor, T.G., Evans, J., Golding, J., & Glover, V. (2004). The course of anxiety and depression through pregnancy and the postpartum in a community sample. *Journal of Affective Disorders*, *80*, 65-73. https://doi.org/10.1016/j.jad.2003.08.004

Hiscock, H.A., Cook, F., Bayer, J., Le, H., Mensah, F., Cann, W., Symon, B., & St. James-Roberts, I. (2014). Preventing early infant sleep and crying problems and postnatal depression: a randomized trial. *Pediatrics*, *133*, 346–54. https://doi.org/10.1542/peds.2013-1886

Hong Law, K., Dimmock, J., Guelfi, K.J., Nguyen, T., Gucciardi, D., Jackson, B. (2019). Stress, depressive symptoms, and maternal self-efficacy in first-time mothers: modelling and predicting change across the first six months of motherhood. *Applied Psychology: Health and Well-being*, *11*, 126-147. http://dx.doi.org/10.1111/aphw.12147

Hoff, C.E., Movva, N., Rosen Vollmar, A.K., & Pérez-Escamilla, R. Impact of Maternal Anxiety on Breastfeeding Outcomes: A Systematic Review. *Advances in Nutrition*, *10,* 816–826. https://doi.org/10.1093/advances/nmy132

Horta, B.L., Loret de Mola, C., Victora, C.G. (2015). Breastfeeding and intelligence: a systematic review and meta-analysis. *Acta Paediatrica*, *104*, 14-19. https://doi.org/10.1111/apa.13139

Hughes, C., Devine, R.T., Foley, S., Ribner, A.D., Mesman, J., & Blair, C. (2020). Couples becoming parents: Trajectories for psychological distress and buffering effects of social support. *Journal of Affective Disorders*, *265*, 372-380. https://doi.org/10.1016/j.jad.2020.01.133

Isabella, R.A., Belsky, J., & Von Eye, A. (1989). Origins of infant-mother attachment: an examination of interactional synchrony during the infant's first year. *Developmental Psychology*, *25*, 12-21. https://doi.org/10.1037/0012-1649.25.1.12

Jansen, J., De Weerth, C., & Riksen-Walraven, M. (2008). Breastfeeding and the mother-infant relationship – A review. *Developmental Review*, *28*, 503-521. https://doi.org/10.1016/j.dr.2008.07.001

Jones, J.D., Cassidy, J., & Shaver, P.R. (2015). Parents' self-reported attachment styles: A review of links with parenting behaviors, emotions, and cognitions. *Personality and Social Psychology Review*, *19*, 44-76. https://doi.org/10.1177/1088868314541858

Kiviruusu O, Pietikäinen, J.T., Kylliäinen, A., Pölkki, P., Saarenpää-Heikkilä, O., Marttunen, M., Paunio, T., & Paavonen, J.E. (2020). Trajectories of mothers' and fathers' depressive symptoms from pregnancy to 24 months postpartum. *Journal of Affective Disorders*, *260*, 629-637.

Kontos, E., Blake, K.D., Chou, W.Y.S., & Prestin, A. (2014). Predictors of eHealth usage: Insights on the digital divide from the health information National Trends Survey 2012. *Journal of Medical Internet Research*, *16*. http://dx.doi.org/10.2196/jmir.3117

Koss, K.J., & Gunnar, M.R. (2018). Annual research review: Early adversity, the hypothalamic–pituitary–adrenocortical axis, and child psychopathology. *Journal of Child Psychology and Psychiatry*, *59*, 327–346. http://dx.doi.org/10.1111/jcpp.12784

Kvalevaag A.L., Ramchandani, P.G., Hove, O., Assmus, J., Eberhard-Gran, M., Biringer, E. (2013). Paternal mental health and socioemotional and behavioural development in their children. *Pediatrics*, *131*, 1-7. https://doi.org/10.1542/peds.2012-0804

Lafontaine, M.F., Brassard, A., Lussier, Y., Valois, P., Shaver, P.R., & Johnson, S.M. (2016). Selecting the best items for a short-form of the Experiences in Close Relationships Questionnaire. *European Journal of Psychological Assessment*, *32*, 140-154. http://dx.doi.org/10.1027/1015-5759/a000243

Leigh, B., & Milgrom, J. (2008). Risk factors for antenatal depression, postnatal depression, and parenting stress. *BMC Psychiatry*, *8*, 24. https://doi.org/10.1186/1471-244X-8-24

Leung, B.M.Y, Letourneau, N.L., Giesbrecht, G.F., Ntanda, H., & Heart, M. (2017). Predictors of postpartum depression in partnered mothers and fathers from a longitudinal cohort. *Community Mental Health Journal*, *53*, 420-431. https://doi.org/10.1007/s10597-016-0060-0

Loyd, B.H., & Abidin, R.R. (1985). Revision of the Parenting Stress Index. *Journal of Pediatric Psychology*, *10*, 169-77. https://doi.org/10.1093/jpepsy/10.2.169

Maycock, B., Binns, C.W., Dhaliwal, S., Tohotoa, J., Hauck, Y., Burns, S., & Howat, P. (2013). Education and support for fathers improves breastfeeding rates. A randomized controlled trial. *Journal of Human Lactation*, *29*, 484-90. https://doi.org/10.1177/0890334413484387

Mason, Z.S., Briggs, R.D., & Silver, E.J. (2011). Maternal attachment feelings mediate between maternal reports of depression, infant social–emotional development, and parenting stress. *Journal of Reproductive and Infant Psychology*, *29*, 382-394. https://doi.org/10.1080/02646838.2011.629994

Matthey, S., Barnett, B., Howie, P., & Kavanagh, D.J. (2003). Diagnosing postpartum depression in mothers and fathers: whatever happened to anxiety? *Journal of Affective Disorders*, *74*, 139-47. https://doi.org/10.1016/S0165-0327(02)00012-5

Matthey, S., Henshaw, C., Elliott, S., & Barnett, B. (2006). Variability in use of cut-off scores and formats on the Edinburgh Postnatal Depression Scale – implications for clinical and research practice. *Archives of Women's Mental Health*, *9*, 309–315. https://doi.org/10.1007/s00737-006-0152-x

McCoy, S.J., Beal, J.M., Shipman, S.B., Payton, M.E., & Watson, G.H. (2006). Risk factors for postpartum depression: A retrospective investigation at 4-weeks postnatal and a review of the literature. *Journal of the American Osteopathic Association*, *106*, 193-198.

McKenna, J.J., Ball, H.L., & Gettler, L.T. (2007). Mother-infant co-sleeping, breastfeeding, and sudden infant death syndrome: What biological anthropology has discovered about normal infant sleep and pediatric sleep medicine. *American Journal of Physical Anthropology*, *134*, 133-161. https://doi.org/10.1002/ajpa.20736

Meaney, M.J. (2018). Perinatal maternal depressive symptoms as an issue for population health. *The American Journal of Psychology*, *175*, 1084-1093. https://doi.org/10.1176/appi.ajp.2018.17091031

Missler, M.A., Van der Laan, G., & Stroebe, M.S. (2014). The work-home interface: The role of home-based predictors of burnout among mothers. *Family Science*, *4*, 148-160. https://doi.org/10.1080/19424620.2013.871740

Missler, M.A., Beijers, R., Denissen, J.J.A., & Van Straten, A. (2018). Effectiveness of a psycho- educational intervention to prevent postpartum parental distress and enhance infant well- being: study protocol of a randomized controlled trial. *Trials*, *19*, 4. https://doi.org/10.1186/s13063-017-2348-y

Missler, M.A., Donker, T., Beijers, R., Ciharova, M., Moyse, C., De Vries, R., Denissen, J., & Van Straten, A. (2021). Preventing postpartum maternal distress: a systematic review and meta-analysis of psychological interventions. *BMC Pregnancy and Childbirth*, *21*, 276. https://doi.org/10.1186/s12884-021-03752

Montgomery, A.J., Peeters, M.C.W., Schaufeli, W.B. & Panagopoulou, E.P. (2008). Cross-over and work-home interference. *The Irish Journal of Psychology*, *29*, 61-76. https://doi.org/10.1080/03033910.2008.10446274

Moon R., & Task Force on Sudden Infant Death Syndrome. (2016). SIDS and other sleep-related infant deaths: evidence base for updated recommendations for a safe infant sleeping environment. *Pediatrics*, *138*, e20162940. https://doi.org/10.1542/peds.2016-2940.

Morris-Rush, J.K., Freda, M., Bernstein, P.S., 2003. Screening for postpartum depression in an inner-city population. *American Journal of Obstetrics and Gynecology*, *188*, 1217-1219. https://doi.org/10.1067/mob.2003.279

Morsbach, S.K., & Prinz, R.J. (2006). Understanding and improving the validity of self-report of parenting. *Clinical Child and Family Psychology Review*, *9*, 1–21. https://doi.org/10.1007/s10567-006-0001-5

Murray, L., Fearon, P., Cooper, P. (2015). Postnatal depression, mother-infant interactions, and child development - prospects for screening and treatment. In J. Milgrom & A. Gemmill (Eds.), *Identifying Perinatal Depression and Anxiety: Evidence-based Practice in Screening, Psychosocial Assessment and Management* (pp. 139-164). Wiley Blackwell: Oxford.

Olssøn, I., Mykletun, A., & Dahl, A.A. (2005). The hospital anxiety and depression rating scale: A cross-sectional study of psychometrics and case finding abilities in general practice. *BMC Psychiatry*, *5*, 46. https://doi.org/10.1186/1471-244X-5-46

Osher, D., Cantor, P., Berg, J., Steyer, L., Rose, T. (2020). Drivers of human development: How relationships and context shape learning and development. *Applied Developmental Science*, *24*, 6-36. https://doi.org/10.1080/10888691.2017.1398650

Panter-Brick, C., Burgess, A., Eggerman, M., McAllister, F., Pruett, K., & Leckman, J.F. (2014). Practitioner Review: Engaging fathers – recommendations for a game change in parenting interventions based on a systematic review of the global evidence. *Journal of Child Psychology and Psychiatry*, *55*, 1187-1212. https://doi.org/10.1111/jcpp.12280

Paulson, J.F., Dauber, S., Leiferman, J.A. (2006). Individual and combined effects of postpartum depression in mothers and fathers on parenting behavior. *Pediatrics*, *118*, 659-668. https://doi.org/10.1542/peds.2005-2948

Pisacane, A., Continisio, G.I., Aldinucci, M., D'Amora, S., & Continisio, P. (2005). A controlled trial of the father's role in breastfeeding promotion. *Pediatrics*, *116*, 494-8. https://doi.org/10.1542/peds.2005-0479

Pop, V.J., Komproe, I.H., & Van Son, M.J. (1992). Characteristics of the Edinburgh Postnatal Depression Scale in The Netherlands. *Journal of Affective Disorders*, *26*, 105-10. https://doi.org/10.1016/0165-0327(92)90041-4.

Rollins, J. (2017). Sharing a room: updated recommendations for a safe infant sleeping environment. *Pediatric Nursing*, *43*, 7.

Rusbult, C.E., Martz, J.M., & Agnew, C.R. (1998).The Investment Model Scale: Measuring commitment level, satisfaction level, quality of alternatives, and investment size. *Personal Relationships*, *5*, 357-91. https://doi.org/10.1111/j.1475-6811.1998.tb00177.x

Smeekens, S., Riksen-Walraven, J.M., & Van Bakel, H.J.A. (2007). Multiple determinants of externalizing behavior in 5-year-olds: a longitudinal model. *Journal of Abnormal Child Psychology*, *35*, 347-61. https://doi.org/10.1007/s10802-006-9095-y

Sockol, L.E., Epperson, C.N., Barber, J.P. (2013). Preventing postpartum depression: a meta-analytic review. *Clinical Psychology Review*, *33*, 1205-1217. https://doi.org/10.1016/j.cpr.2013.10.004

Sockol, L.E. (2015). A systematic review of the efficacy of cognitive behavioral therapy for treating and preventing perinatal depression. *Journal of Affective Disorders*, *177*, 7-21. https://doi.org/10.1016/j.jad.2015.01.052

Sockol LE. (2018). A systematic review and meta-analysis of interpersonal psychotherapy for perinatal women. *Journal of Affective Disorders*, *232*, 316-328. https://doi.org/10.1016/j.jad.2018.01.018

Spinhoven PH, Ormel J, Sloekers PPA, Kempen GIJM, Speckens AEM, & Van Hemert AM. A validation study of the Hospital Anxiety and Depression Scale (HADS) in different groups of Dutch subjects. (1997). *Psychological Medicine*, *27*, 363-70.

Sroufe, A.L. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. 2005: *Attachment & Human Development*, *7*, 349-367. https://doi.org/10.1080/14616730500365928

Statistics Netherlands (2018). The Netherlands leads Europe in internet access. https://www.cbs.nl/en-gb/news/2018/05/the-netherlands-leads-europe-in-internet-access. Accessed 21 July 2020.

Stein, A., Pearson, R.M., Goodman, S.H., Rapa, E., Rahman, A., McCallum, M., Howard, L.M., & Pariante, C.M. (2014). Effects of perinatal mental disorders on the fetus and child. *The Lancet*, *384*, 1800-1819. https://doi.org/10.1016/S0140-6736(14)61277-0

Sweeney S, MacBeth A. (2016). The effects of paternal depression on child and adolescent outcomes: A systematic review. *Journal of Affective Disorders*, *205*, 44-59. https://doi.org/10.1016/j.jad.2016.05.073

Tabachnik, B.G., & Fidell, L.S. (2007). Multilevel linear modeling. In S. Hartman (Ed.), *Using Multivariate Statistics* (pp. 781-857). Boston, MA: Pearson Education Inc.

Tissera, H., Auger, E., Séguin, L., Kramer, M.S., & Lydon, J.E. (2020). Happy prenatal relationships, healthy postpartum mothers: a prospective study of relationship satisfaction, postpartum stress, and health. *Psychology & Health*, 36, 461-477. https://doi.org/10.1080/08870446.2020.1766040

Tollenaar, M.S., Beijers, R., Jansen, J., Riksen-Walraven, J.M., & De Weerth, C. (2012). Solitary sleeping in young infants is associated with heightened cortisol reactivity to a bathing session but not to a vaccination. (2012). *Psychoneuroendocrinology*, *37*, 167-77. https://doi.org/10.1016/j.psyneuen.2011.03.017

US Preventive Services Task Force. Interventions to prevent perinatal depression: US Preventive Task Force recommendation statement. (2019). *JAMA*, *321*, 580-587. https://doi.org/10.1001/jama.2019.0007

Van Bussel, JCH, Spitz B, & Demyttenaere K. (2010).Three self-report questionnaires of the early mother-to-infant bond: reliability and validity of the Dutch version of the MPAS, PBQ and MIBS. *Archives of Women's Mental Health*, *13*, 373-84. https://doi.org/10.1007/s00737-009-0140-z

Van Scheppingen, M. A., Denissen, J. J. A., Chung, J. M., Tambs, K., & Bleidorn, W. (2018). Self-esteem and relationship satisfaction during the transition to motherhood. *Journal of Personality and Social Psychology*, *114*, 973–991. https://doi.org/10.1037/pspp0000156

Victora, C.G., Bahl, R., Barros, A.J.D., França, G.V.A., Horton, S., Krasevec, J., Murch, S., Jeeva Sankar, M., Walker, N., Rollins, N.C. (2016). Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *The Lancet*, *387*, 475-490. https://doi.org/10.1016/S0140-6736(15)01024-7

Wajid, A., Kingston, D., Bright, K.S., Mughal, M.K., Charrois, E.M., & Giallo, R. (2020). Psychosocial factors associated with trajectories of maternal psychological distress over a 10-year period from the first year postpartum: An Australian population-based study. *Journal of Affective Disorders*, *263*, 31-38. https://doi.org/10.1016/j.jad.2019.11.138

World Health Organization. (2017). 10 facts on breastfeeding. https://www.who.int/features/factfiles/breastfeeding/en/. Accessed 12 Feb 2020.

Yelland, J., Sutherland, G., Brown, S.J. (2010). Postpartum anxiety, depression and social health: findings from a population-based survey of Australian women. *BMC Public Health*, *10*, 771. https://doi.org/10.1186/1471-2458-10-771

Young C, Roberts R, Ward L. (2020). Hindering resilience in the transition to parenthood: a thematic analysis of parents' perspectives. *Journal of Reproductive and Infant Psychology.* https://doi.org/10.1080/02646838.2020.1757630

7

General discussion

This dissertation focused on parental distress during the transition to parenthood. While the birth of a child can compromise parental mental health (e.g. Dennis et al., 2017), parental distress can also jeopardize caregiving quality. We do not refer here to parents' functional caregiving, such as the ability to provide children with clothing or toys. Parental distress might negatively affect precisely those factors that determine whether a child *feels* cared for. As an important precondition for healthy development, children need to feel that parents have their best interests at heart (Osher et al., 2020). This can be expressed by providing the child with a safe and warm environment, in which parents are sensitive and responsive to the child's needs. Thus, studying parental distress is important not only from a parental health perspective, but also when considering the healthy development of their children. Here, our findings will be discussed, starting with describing prevalence rates of parental distress postpartum and risk factors for developing distress. The discussion continues with the consequences of distress for children. Then, based on a literature review and our own psychoeducational intervention, the prevention of parental distress postpartum will be discussed. Also, the strengths and weaknesses of the studies in this dissertation will be addressed. The discussion will conclude with describing the implications of our studies for future research and clinical practice.

Parental distress

The transition to parenthood is a major life event, often accompanied by joy and happiness. However, becoming a parent has also been associated with significant distress, which can range from relatively mild symptoms to clinical-level symptomatology. Chapter 3 demonstrated that, in a Dutch community sample, the prevalence of self-reported postpartum depression for mothers was 14% at 3 months postpartum. For, anxiety, the prevalence rate was 8%. In our randomized controlled trial (Chapter 5), maternal prevalence rates for depression and anxiety symptomatology at 10 weeks postpartum were 8 and 22% respectively.

These prevalence rates are line with previous research among community samples which showed prevalence rates for maternal depression and anxiety symptomatology postpartum, ranging from 8-40 % (Dennis et al., 2017; Heron et al., 2004; McCoy et al., 2003; Morris-Rush et al., 2006), with even considerably higher percentages of 20-40% in at-risk samples (McCoy et al., 2003; Morris-Rush et al., 2006). In Chapter 2, we also explored a relatively understudied form of parental distress: namely maternal burnout symptomatology. Importantly, the burnout syndrome is correlated with both depression and anxiety (Koutsimani, Montgomery, & Georganta, 2019), and the distinction between

burnout and depressive disorders is debated (Bianchi, Schonfeld, & Laurent, 2015). Therefore, parents reporting burnout symptomatology might also suffer from depressive or anxiety symptoms. Our results showed that, during the first 4 years after birth, 10% of mothers suffered from symptoms of one of the core dimensions of burnout, namely exhaustion (Maslach, Jackson, & Leiter, 1996).

Subsequently, we examined the development of self-reported depression and anxiety symptomatology for mothers during 12,5 years after birth with validated screening tools. While about two-third of mothers did not show signs of depression or anxiety at any of the time points, about one third did. When taking a closer look at the first year after birth, 23.6% of mothers showed symptoms of depression at any time during this year, and 12.6% showed symptoms of anxiety. After the first year, the prevalence rates for depression and anxiety symptoms varied between 7 and 13%. In the general Dutch population, the 12-month prevalence rate for a full-blown mood disorder (assessed with a clinical interview) is about 10%, and about 17% for any anxiety disorder (Bijl, Ravelli, & Van Zessen, 1998). Thus, except for the prevalence rate of depression during the first year after birth, which is markedly higher, the prevalence rates in our study are in line with prevalence rates for depression and anxiety disorders reported in the Dutch population. This indicates that in our universal sample of mothers, not selected based on their risk for developing distress after birth, there is a heightened risk of postpartum depression symptomatology, but -for both depression and anxiety- the prevalence rates after the first year after birth are comparable to the prevalence rates in the general population.

Next to the prevalence of maternal distress, we investigated risk factors for the development of postpartum distress. With regard to maternal postpartum depression, several robust risk factors have been identified in previous research, namely a history of depression; psychological problems during pregnancy; low social support; and stressful life events during pregnancy or the early postpartum period (O'Hara and Swain, 1996; Leigh & Milgrom, 2008; Righetti-Veltema et al., 1998; Robertson, Grace, Wallington, & Stewart, 2004; Silverman et al., 2017). Much less research is devoted to identify risk-factors for postpartum anxiety. The main predictors currently identified are: low socio-economic status, a history of psychological problems; and prenatal anxiety (Wenzel, Haugen, Jackson, & Brendle, 2005; Dennis, Falah-Hassani, Brown, & Vigod, 2016). However, for the prediction of other types of distress, such as burnout symptomatology among parents (Séjourné et al., 2018; Roskam, Brianda, & Mikolajczak, 2018) much remains unclear.

We examined parenting appraisals (stress and satisfaction with regard to the parental role) as potential predictors of burnout symptomatology among mothers (Chapter 2). Since parents report to feel overwhelmed by the seemingly unlimited demands that come with the parenting role (Young, Roberts, & Ward, 2020), and by doubts about their parenting skills (Henshaw, Cooper, Jaramillo, Lamp,

Jones, & Wood, 2018; Hong Law, Dimmock, Guelfi, Nguyen, Gucciardi, & Jackson, 2019) it is remarkable that relatively little is known about risk factors that are associated with how parents experience their new role and the changes that are connected to the transition to parenthood. Therefore, next to parenting appraisals, we included satisfaction with professional childcare arrangements.

Results showed that mothers' appraisal of their role as a parent was associated with burn-out symptomatology through the experience of home-work interference. Mothers who were more satisfied with their role seemed to be better able to integrate home and work responsibilities, and they experienced less burnout symptomatology. Alternatively, mothers who appraised their new role more negatively experienced higher levels of conflict between the home and work domains, and more symptoms of burnout. Furthermore, the emotional component of satisfaction with professional childcare arrangements was identified as a predictor of higher levels of parenting stress. This component encompasses the feelings parents hold about bringing their child to the day care center (e.g. feelings of guilt or separation anxiety). Parents who struggled with more negative feelings around their professional childcare arrangements showed more parenting stress. This way, our study contributes to existing research by identifying potential predictors of maternal distress symptomatology which relate to the adaptation process to parenthood and the changes in the home situation that are connected to the transition to parenthood.

Until now, we focused on distress in mothers. However, fathers also experience a significant degree of distress postpartum. For both depression and anxiety symptomatology, paternal postpartum prevalence rates are about 10% (Matthey, Barnett, Howie, & Kavanagh, 2003; Paulson, Dauber, & Leiferman, 2006; Rao et al., 2020). In our randomized controlled trial, paternal prevalence rates of depression and anxiety symptoms at 10 weeks postpartum were even higher (14% and 20%). Compared to mothers, whose depression and anxiety trajectories seem to peak in the first months after birth and show relative stability afterwards, research shows that father's symptomatology gradually worsens over time (Hughes, Devine, Foley, Ribner, Mesman, & Blair, 2020; Chen et al., 2019), at least for fathers with higher levels of symptomatology during their partner's pregnancy (Kiviruusu et al., 2020). This underlines the importance of the early detection of distress in fathers as well.

While known risk factors for developing distress postpartum seem to apply to both mothers and fathers, it has been suggested that, compared to mothers, father-specific risk factors relate more strongly to the adaptation process to parenthood and the combination of multiple roles (Giallo et al., 2013; Kiviruusu et al., 2020; Chen et al., 2019). Therefore, it would have been interesting to investigate if parenting appraisals (stress and satisfaction with regard to the parental role) predict burnout symptomatology among fathers as well, but this remains a research question for future research.

Parental distress and child development

One of the aims of this dissertation was to examine how parental postpartum distress is related to children's development. This aim was addressed in Chapter 3 in which we focused on the association between maternal distress symptomatology throughout the first 12.5 years of parenthood and children's internalizing and externalizing problems at this age in a community sample of 193 mothers. We were able to distinguish between chronic and transient depression and anxiety symptomatology levels by using latent trait-state occasion modeling (Cole, Martin, & Steiger, 2005). Individual differences in maternal depression and anxiety symptomatology showed a high degree of consistency over time. This implies that transient, external influences were relatively less important in explaining symptom levels. Moreover, chronic maternal depression and anxiety symptomatology was related to mother–and child-reported internalizing problems of the child at the age of 12.5 years. No associations between maternal symptomatology and children's externalizing difficulties were found. Thus, enduring maternal symptomatology, regardless of its severity, seems to be associated with children's development, not only at a preschool age but also when they are transitioning to secondary school.

The association between chronic maternal symptomatology and internalizing difficulties of (young) children has been demonstrated before (Brennan et al., 2000; Netsi et al., 2018; Hentges et al., 2020). However, our study adds to the existing body of knowledge by showing that this association can also be found in a non-clinical sample. This indicates that beyond clinical-level symptomatology, also chronic mild symptomatology is associated with children's internalizing problems. Furthermore, we are the first to demonstrate this over a longer period of time from birth to the beginning of adolescence (12.5 years). The mechanisms through which chronic maternal symptomatology leads to children's internalizing difficulties are not known yet. Several mechanisms could be hypothesized such as the quality of parenting, the modeling of parental distress-related behavior and cognitions, and a shared genetic susceptibility for developing distress symptomatology. These mechanisms will be reviewed briefly below.

First, parental distress is associated with the quality of parenting (Crnic, Gaze, & Hoffman, 2005; Koss & Gunnar, 2018). One of the most central aspects of caregiving quality is parents' sensitive responsiveness (Stein et al., 2014; Osher et al., 2020). As distressed parents might be less able to focus their attention on, and respond to their environment (Stein et al., 2014), parental distress can compromise parents' ability to be sensitive for the child's needs. Parental sensitivity is related to lower

infant stress levels (Albers, Beijers, Riksen-Walraven, Sweep, & De Weerth, 2016), and developmental milestones when children grow older, such as social competence (Sroufe, 2005) and self-regulatory capacities (Bridgett, Burt, Edwards, & Deater-Deckard, 2015; Morawska, Dittman, & Rusby, 2019). Thus, maternal distress symptomatology might thus be related to children's internalizing problems through reductions in sensitive parenting.

There are other aspects of parenting that might contribute to the development of children's internalizing problems. Parental distress has been related to an intrusive, overprotective and over-controlling parenting style (Gerlsma, Emmelkamp, & Arrindell, 1990; Stein et al., 2014). This style of parenting is characterized by hyperregulation of children's emotions and behavior, constant vigilance, and the provision of minimal space for children to regulate their emotions and practice their problem-solving skills, and has been associated with the development of anxiety in children (Bögels & Brechman-Toussaint, 2006). For example, overregulated parenting at the age of 2 years was related to less self-regulatory skills at age 5 and subsequently, more child-reported internalizing problems at age 10 (Perry, Dollar, Calkins, Keane, Shanahan, 2018). Thus, chronic parental distress symptomatology might be related to children's internalizing problems through reduced quality of parenting, which can be expressed by less sensitive parenting and/or an overprotective, overcontrolling parenting style.

Furthermore, children could acquire internalizing problems through the modeling of parents' distress-related behavior or a negative (depressive or anxious) cognitive style (Bögels & Brechman-Toussaint, 2006). On a behavioural level, this modeling can occur by children observing parental anxious or avoidant behavior (e.g. Fisak & Grills-Taquechel, 2007). Experimental research showed that children displayed increased fear in response to parents' anxious behavior (De Rosnay, Cooper, Tsigaras, & Murray, 2006; Gerull & Rapee, 2002). Also on a cognitive level, school-aged children showed higher levels of anxious cognitions in response to anxiety expressed by their parent (Burstein & Ginsburg, 2010), as well as more negative self-evaluations about their performance when giving a speech (Becker & Ginsburg, 2011). Even in very young children, exposure to maternal depression was related to more negative cognitions during a potentially stressful situation (Murray, Woolgar, Cooper, & Hipwell, 2001). Thus, the modeling of parental distress-related behavior and/or parents' negative cognitive style could fuel the development of internalizing problems in children.

Next to the quality of parenting and the modeling of parental behavior and cognitions, other mechanisms are likely to play a role, including a shared genetic susceptibility between mother and child for developing symptoms of psychopathology (Stein et al., 2014; Koss & Gunnar, 2018). In this case, mothers who have a chronic predisposition for negative affect will pass on this disposition to their children, who would then be more likely to develop internalizing problems themselves.

Contrary to previous research (e.g. Brennan et al., 2000; Netsi et al., 2018; Hentges et al., 2020), we did not find an association between maternal symptomatology and children's externalizing difficulties. This finding does further support the role of direct genetic transmission, since trait negative affect (including depression and anxiety symptomatology) is phenotypically much closer to internalizing problems than to externalizing problems. Furthermore, in contrast to previous studies, which measured children's behavior between the ages of 2 and 5 years, our measurement took place at the age of 12.5 years. Importantly, compared to internalizing problems, externalizing problems seem to have an earlier age of onset (Kessler, Amminger, Aguilar-Gaxiola, Alonso, Lee, & Ustün, 2007), and tend to decrease over time during the preschool years (Miner & Clarke-Stewart, 2008). It might thus be that children respond relatively more with externalizing problems to maternal distress early in childhood, while internalizing problems become more salient at an older age.

It could also be that there actually is an association between maternal distress and children's externalizing problems in older children, but that this is only true for subgroups of children. According to the diathesis stress or differential susceptibility hypothesis (Belsky 1997a, 1997b; Belsky, 2005), chronic maternal distress symptomatology might only be associated with externalizing difficulties in adolescents with a specific vulnerability or susceptibility. For example, children who received lower care quality reported more externalizing problems in adolescence, but only when they had more temperamental negative affectivity during infancy (Belsky & Pluess, 2011). Also, maternal insensitivity early in childhood was associated with children's externalizing problem behavior, but only when children had the DRD4 7R allele genotype (Windhorst et al., 2015; King et al., 2016). Thus, the association between chronic maternal symptomatology and children's internalizing and externalizing problems might differ depending on specific characteristics of the child, and this might stay undetected when –as we did in our study- analyzing a sample of children varying in temperament and genotype.

Importantly, if maternal distress is related differently to children's internalizing and externalizing problems depending on the child's age or a specific vulnerability/susceptibility, the use of a total problem behavior scale (Brennan et al., 2000; Netsi et al., 2018) versus the use of internalizing and externalizing subscales (Hentges et al., 2020; Kingston et al., 2018), might conceal these potential differential associations. In our study, we measured internalizing and externalizing problems separately through the internalizing and externalizing dimensions of the Strengths and Difficulties Questionnaire (Goodman, Lamping, & Ploubidis, 2010). To shed more light on whether maternal distress is differently related to children's internalizing and externalizing problems at different stages of the child's development, we would recommend future research to also distinguish between the externalizing and internalizing dimensions when assessing children's behavior, and to refrain from investigating total problem behaviors.

With regard to temporary fluctuations in maternal symptomatology, the only association emerged between maternal depression symptomatology measured at the child's age of 12.5 years and transient deviations from their chronic level of depression and anxiety symptomatology at the age of 12.5 years. This might reflect the bi-directionality of this association: maternal distress symptoms might not only affect her child's behavior, but children's problems might also function as a catalyst for maternal distress levels. However, since no associations emerged between maternal symptomatology at the child's age of 12.5 years and internalizing problems as reported by the child, it is also possible that maternal symptomatology negatively biased her interpretation of the child's behavior (Fergusson, Lynsky, & Horrwood, 1993; Beijers et al., 2020).

Interventions to prevent parental distress

The relatively high prevalence of parental symptomatology after birth, the chronic character of this symptomatology (Chapters 1 & 2), as well as the association between chronic (sub-clinical) symptomatology and child development (Chapter 2), suggest the importance of a *preventive* approach that is aimed at all pregnant women, regardless of their pre-existing risk for developing distress or their level of symptomatology. However, while previous reviews and meta-analyses have suggested that both indicated (Clatworthy, 2012; US Preventive Service Task Force, 2019) as well as selective prevention (Sockol et al. 2013; Sockol 2015; Sockol, 2018) are effective for the prevention of postpartum depression symptomatology, little is known about the effectiveness of *universal* prevention of parental distress symptomatology during the transition to parenthood (Evans et al. 2018; Sockol, 2018). Also, much is unknown about the effectiveness of preventive interventions on other forms of distress beyond depression, such as anxiety and general stress (Evans et al., 2018; Sockol, 2018).

Therefore, we systematically reviewed and meta-analyzed the available evidence with regard to the effectiveness of preventive interventions on depression, anxiety, and stress symptomatology offered to universal populations of pregnant women (Chapter 3). We included 12 studies examining the effectiveness of universal prevention, incorporating a total of 2559 pregnant women. The majority of the included studies (n = 9) excluded women with current or former symptoms or a diagnosis of psychopathology. The remaining three studies did not use any indicator of the presence of psychopathology (symptoms or diagnosis) as an explicit exclusion criterion. The included preventive interventions were mostly provided in a group setting; included multiple sessions (mean number of

sessions was 9); were facilitated by a psychologist or midwife; and were based on a variety of psychological theories (mindfulness, cognitive-behavioural therapy, and interpersonal psychotherapy). Next to these therapeutic techniques, most interventions incorporated psychoeducation about postnatal distress, relaxation techniques and the acquisition of emotion regulation skills. The majority of interventions were implemented prenatally, one third of the interventions included also postnatal sessions.

Even though the studies were aimed at prevention, they did not actually examine the prevention or delay of a disorder. All but one study examined the effects in terms of symptom reduction. Of the 12 included studies, four focused exclusively on depression as an outcome, one on anxiety and another one on stress. The remaining studies focused on both depression and/or anxiety and/or stress. To be able to study the effect of universal prevention on general distress, we calculated the pooled effect size, thereby combining depression, anxiety, stress, in one distress measure. The meta-analysis showed a moderate effect of universal prevention on this combined measure of distress (d=.52). The effect of the preventive interventions was also significant for the three distress measures separately. Moderate effect sizes were obtained for depressive symptomology (d=.50) and general stress (d=.52); the effect on anxiety (d=.30) was somewhat smaller. These results indicate that, next to indicated and selected prevention, universally applied interventions can be valuable in decreasing symptoms of distress.

Importantly, only one of the included studies focused on the postpartum incidence of a disorder as an outcome (Mao et al., 2012) and this study showed a preventive effect of the emotion self-management program on depression diagnosis after birth. To be able to detect whether universal prevention has an effect on disorder caseness, future studies are encouraged to report the incidence rate of depression and other mental disorders as an outcome. Given the large sample sizes needed for testing the effectiveness of universal prevention on incidence rates among the general population (Cuijpers, 2003), this can be difficult. However, promising solutions to this problem have been proposed, such as targeting multiple disorders within one intervention (Cuijpers, 2003). Especially in case of universal prevention, interventions can be designed in such a way that they focus on risk or protecting factors which are associated with multiple disorders, such as enhancing resilience or problem solving skills.

Next to meta-analyzing the effectiveness of universal prevention on a range of maternal distress outcomes, a second aim of our review was to determine whether universal prevention can contribute to the prevention of paternal distress. However, even though paternal prevalence rates of distress almost equal those of mothers (Matthey, Barnett, Howie, & Kavanagh, 2003; Paulson, Dauber, &

Leiferman, 2006; Rao et al., 2020, see also Chapter 6), and research into the development of and risk factors for paternal distress has been accumulating (Da Costa et al., 2019; Giallo et al., 2013; Underwood et al., 2017; Chen et al., 2019), only two universal prevention studies assessed the partner's distress outcomes. Given the low number of trials focusing on the partner, reliable conclusions about the effectiveness of universal prevention on partners could not be drawn yet.

Also, given the association between parental distress and infant development (Goodman et al., 2011; Field, 2018; Meaney, 2018; Murray et al., 2015), a third aim of our meta-analysis was to assess the effectiveness of universal prevention on child outcomes. As only one study (Feinberg & Kan, 2008) focused on infant developmental outcomes beyond pregnancy, an important finding emerging from our meta-analysis is the lack of interventions focusing on the effectiveness of universal prevention on infant outcomes. Therefore, to be able to assess whether targeting parental distress can alleviate negative effects on the infant or improve the infant's well-being, future trials are recommended to also incorporate outcomes with regard to the child. Examples of potential outcomes are parental quality of caregiving (e.g. breastfeeding rates, observed sensitive responsiveness) and infant behaviour (e.g. crying and sleeping patterns).

Development of a low-intensity psychoeducational prevention program

The results of our meta-analysis indicated that universal prevention during the perinatal period is effective in reducing parental distress symptomatology and might be effective in the prevention of psychological disorders postpartum. However, since the interventions that were included in our study consisted of multiple (group) sessions and needed to be delivered by a psychologist or midwife, they asked for a relatively high amount of effort from both parents as well as facilitators. The intensity of these interventions could potentially hinder the large-scale implementation necessary for universal prevention to occur. Therefore, our goal was to develop a brief and easily accessible intervention, which could be implemented at relatively low costs, and to study whether such an intervention would also be effective in preventing distress among a universal population of parents.

Meta-analytic evidence indicated that brief psychoeducational interventions can be effective in reducing symptoms of psychological distress among the general population (Donker, Griffiths, Cuijpers, & Christensen, 2009). Therefore, given that parents report a clear need for reliable and scientifically validated information about the transition to parenthood (Henshaw et al., 2018), we aimed to provide them with concise, up to date and evidence-based information about the first months

postpartum, during which parents have to adapt to the parenting role and the infant is completely dependent on the parents for feeding and stress-regulation. The intervention was explicitly targeted at both parents.

In a randomized controlled trial, we examined the effectiveness of this brief psychoeducational intervention on parental distress (parenting stress, depression, and anxiety), parental well-being and the quality of caregiving behavior (breastfeeding, room-sharing, and bonding). Results of the trial showed no significant effects on the distress outcomes between the intervention and control group. However, parents rated the provided information as useful and of added value. Thus, the intervention seemed to fill a gap in the information and tools that are currently available for parents-to-be but did not seem to be effective in preventing postpartum distress. Several factors could explain why an intervention rated by parents as useful was not effective on preventing parental distress and enhancing parental well-being, nor in stimulating their quality of caregiving.

First, we followed parents until 10 weeks after birth, because infant crying rises until 6 weeks and gradually decreases thereafter. Following parents for 10 weeks would enable us to capture this potentially stressful infant crying peak (Barr, 1990) at 6 weeks postpartum. However, it could be that the tools we provided parents with have a buffering effect on other potential peaks of parental distress taking place later on during the first year. For example, Hiscock et al. (2014) showed an effect of their psychoeducational intervention implemented shortly after birth on maternal depressive symptoms at 6 months postpartum, while this effect did not emerge at 4 months after birth. Also, since many parents are still breastfeeding and room-sharing during the first 10 weeks postpartum, differences in total breastfeeding and room-sharing duration might become visible after this period.

A second possibility is that the intervention was not effective on parental distress or the included quality of caregiving but on other measures that we did not take into account, such as observed caregiving quality, parental stress physiology, or infant behavior. Direct observation of parents' sensitive responsiveness at various moments during the first year would enable us to detect whether the intervention is supportive for parents in developing these skills. This would add to the use of self-report measures, which are affected by social desirability (Morsbach & Prinz, 2006). Parental physiological stress measures, such as cortisol measurements in hair, could give insight in parental stress physiology beyond self-reported distress. Furthermore, next to parental reports, direct measures of infant behavior could be added, such as a registration of infant crying patterns. This way, potential effects of the intervention on infant behavior could be monitored (Barr, Kramer, Boisjoly, McVey-White, & Pless, 1988).

Third, our sample mainly consisted of relatively highly educated first-time parents, who could be more likely to seek and find information about pregnancy and childrearing themselves compared to their lower-educated counterparts. However, as stated before, having access to information does not necessarily reduce stress. Parents varying in income, education, and ethnicity all reported to get lost in the overload of available information (Henshaw et al., 2018). The crucial element seems to be to supply parents with a roadmap towards reliable and evidence-based information (Young et al., 2020). Therefore, we expected that the intervention would also support higher-educated parents in reducing their levels of distress. Relatedly, we did not have information about pre-existing risk factors, which could moderate the effectiveness of the intervention. It might be that the intervention is more effective for parents with a history of psychosocial problems, parents with a complicated delivery, or parents with low levels of social support. Whether subgroups of parents would benefit more from (elements of) the intervention, should be tested in future research.

It is also possible that our brief psychoeducational intervention is not sufficient to influence parents' levels of distress and their caregiving quality. The question arises, then, why our universal prevention program was not effective on different indices of parental distress and parental well-being, while the results of our meta-analysis pointed to the potential value of universal prevention. An important difference with the studies included in the meta-analysis, is that the majority of the included interventions in the meta-analyses (*n*=10) included one or more group sessions. While we aimed for a compact and concise intervention, adding one group session during which parents could discuss the materials with each other could have provided the parents with an additional source of social support. Furthermore, the interventions included in our meta-analysis did not only incorporate psychoeducational elements, but also a wide variety of other therapeutic techniques, such as cognitive-behavioural therapy, mindfulness, meta-cognitive therapy, acceptance and commitment therapy, and positive psychology (e.g. Haga et al., 2019). Even though these interventions ask more from parents with regard to time and energy, they might be necessary for universal prevention interventions to be effective on parental distress postpartum.

Expanding a brief universal prevention program by adding sessions and/or therapeutic elements (e.g. psychoeducation, mindfulness, cognitive-behavioral techniques) always comes with extra costs, both in terms of parents' time and energy and the implementation of the intervention in regular health care settings. Thus, there is a trade-off between the intensity of the intervention, the costs of its implementation, and the expected benefits for parental and child health. A thorough cost-benefit analysis could offer more insight into the optimal level of intensity of interventions targeting an universal population of parents, to reach an impact on 1) parental levels of distress symptomatology and 2) their quality of caregiving.

Strengths and limitations

This dissertation has several strengths as well as limitations. The inclusion of the partner in our studies is an important strength. In the randomized controlled trial, we were able to include 138 mothers as well as a substantial number of fathers (*n*=96). Unfortunately, in the meta-analysis, only two interventions focused on fathers. The inclusion of fathers sheds more light on whether their needs differ from those of mothers, and whether prevention can be valuable to both of them. While the information was explicitly aimed at both mothers and fathers, and both parents indicated that the intervention was useful to them, mothers were significantly more satisfied with the information booklet than fathers. The antecedents of these differential views between mothers and fathers are unclear. It could indicate that fathers benefit more from other types of information, that they would prefer other ways to access the information, or that they are less in need of information. Another option could be that other types of prevention are more beneficial to them, such as group meetings with other fathers. The potential differential needs of fathers compared to mothers needs to be targeted by future research. Another strength is that we used trait-state occasion modeling in Chapter 3, which enabled us to distinguish between chronic and transient maternal symptomatology and to test both as separate predictors of children's development at the age of 12.5 years. By using this method, we could not only account for the pattern of relative stability that is inherent to many psychopathological constructs, but also address a limitation of many previous studies into chronicity of maternal anxiety and depression, namely the confounding of symptom chronicity with symptom severity. Furthermore, in this longitudinal study, both mothers and children reported on the child's behavior. Interestingly, there was a significant difference between maternal and children's observations, pointing to the importance of including child's own observations, in addition to parental reports (De Los Reyes & Kazdin, 2005; Beijers et al., 2020).

A limitation of this dissertation is that, while our meta-analysis showed that universal prevention is valuable on symptoms of distress, we could not determine whether universal prevention during the transition to parenthood actually affected incidence rates of mental disorders. In our trial, we aimed for a universal sample of parents, and excluded parents with current psychological treatment for psychopathology or psychological treatment in the 6 months before registration. We expected a low full-blown disorder incidence rate during the follow-up period (which lasted until 10 weeks after birth). If we were to examine differences in incidence rate between the two groups we

would have needed a much larger sample and a longer follow-up period which was not feasible. Therefore, we decided not to assess the presence of a disorder at all, but to examine symptomatology only. Another limitation is that samples in our studies --including in the meta-analysis-- existed of relatively highly educated women. It has been shown before that lower-educated women are less likely to follow antenatal classes (such as yoga; Baron, Manniën, te Velde, Klomp, Hutton, & Brug, 2015). In general, people with a lower socio-economic status seem to be less likely to engage in eHealth solutions compared to their counterparts with higher socio-economic status (Kontos, Blake, Chou, & Prestin, 2014). Although our intervention was mostly offered offline (i.e booklet, home-visit, postpartum phone call), and all materials were designed in such way that they were accessible and understandable for parents from various educational levels, we were not able to attract many lower-educated women. This indicates that more research is necessary on how universal prevention can reach women from different demographic backgrounds. While parents were unequivocal in pointing to the need for reliable and evidence-based information regardless of their socioeconomic status (Henshaw et al., 2018), it is possible that less educated parents have even less resources to find the necessary information and thus would benefit more when this information would be consequently provided during pregnancy. This should be investigated in future research.

Future research

While this dissertation pointed to the value of universally applicable interventions in preventing parental distress, several research questions remain to be answered. First and foremost, how can we support fathers during the transition to parenthood? While fathers experience a significant degree of distress postpartum, they have been largely overlooked in existing interventions. Importantly, results of our randomized controlled showed that they are willing to take part in a psychoeducational prevention program. However, the finding that fathers were significantly less satisfied with the information booklet raises the question whether mothers and fathers have differential needs with regard to preventive support during pregnancy. To be able to answer this question, partners (in the majority of cases the father) should be involved in the development of interventions as well as in prevention research. This could shed more light on whether mothers and fathers need different types of support, and/or at different times during the perinatal period.

A second question is whether the positive effects of universal prevention lead to improved quality of parent's caregiving and subsequent enhancement of the child's development. While our

study lacked the necessary resources for such measures, adding observations of parent-infant interaction could shed more light on whether the intervention affects parental caregiving quality. These observations could include ratings of both parents' sensitive responsiveness towards their child, but also measures of parent-infant synchrony, which refers to parents' ability to tune in to, acknowledge, and adapt to the child's signals and affective states (Feldman, 2007). Parent-infant synchrony can be measured both on a social level (i.e. the matching of parents' and children's behavior and affective states; Priel, Djalovski, Zagoory-Sharont, & Feldman, 2019) as well as on a physiological level (i.e. respiratory synchrony; McFarland, Fortin, & Polka, 2019) and is an important marker of parent-child relationship quality. Moreover, parent-infant synchrony is an essential precondition for children's healthy socioemotional development (Feldman, 2007; McFarland et al., 2019).

Furthermore, since it is the chronic variance in maternal symptomatology that seems to be related to child development, the effect of universal prevention of parental distress on children's behavior and development should be observed over longer periods of time and at different levels (i.e. social and cognitive). Moreover, the differences in views between mothers and children with regard to internalizing and externalizing problems that emerged from this dissertation point to the importance of including different observations, such as the views of parents, teachers, and peers; children's self-evaluations; and tasks assessing developmental milestones in a laboratory setting. Researchers should also consider adding biological indices of children's health and development, such as measuring the infant's brain growth by using ultrasounds (Roza et al., 2008; Ghassabian et al., 2012) or by observing the development of the immune system (Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002; Graham, Christian, & Kiecolt-Glaser, 2006). By showing whether parental distress and differences in parental caregiving behavior are also related to developmental changes on a biological level, these measures could add to our understanding of the associations between (chronic) parental distress, quality of caregiving, and child development; and might inform the development of effective interventions.

Third, while parental distress is a broad construct encompassing milder forms of distress as well as clinical-level symptomatology, most studies still focus on depressive symptomatology as the sole outcome of prevention research. Since postpartum prevalence rates of anxiety symptomatology appear similar to those of depression, including measures of anxiety as an outcome of preventive interventions is recommended. Furthermore, as our research showed associations between relatively milder forms of distress (i.e. parenting stress) and the more severe burnout syndrome, future interventions need to also target more general threats to well-being, such as lowered self-efficacy, increased worrying, feelings of exhaustion, and stress related to the parenting role. Importantly, parents who find themselves at various places alongside the parental distress continuum might benefit

from different preventive approaches. Therefore, tailoring interventions to the differential needs of parents who vary in type of distress could be a fruitful avenue for future research.

Finally, universally applicable interventions should be tested among parents with varying background characteristics, such as educational level, income, and psychosocial history. Given that our sample consisted mainly of higher-educated parents, an important question for future research is how to include lower-educated parents in prevention research. Given the wide variety in existing interventions, as well as the relative high amount of effort that is needed from mothers as well as facilitators, future research should shed more light on how universal prevention can support these different groups of parents in a concise and cost-effective way. This way, large-scale implementation – necessary for the universal prevention of parental distress – could be facilitated.

Clinical implications

This dissertation showed that parental distress after birth and across childhood is highly prevalent, also in low-risk community samples. Moreover, this distress is relatively stable over time, which is related to children's internalizing problems. Thus, early prevention of parental distress seems valuable. Notably, universal prevention during pregnancy is effective in preventing depression, anxiety, and general stress symptomatology. However, based on our study of the low-intensity psychoeducational prevention program, it is still unclear whether psychoeducation as stand-alone treatment would be sufficiently effective. As parents did consider the received information as useful and valuable, especially the information booklet, we recommend offering the information booklet as part of routine care for pregnant women and their partner. As prenatal care in The Netherlands consists of regular consults with a midwife or gynecologist, these professionals could play a role in distributing the information booklet during one of the consults at the start of the third trimester of pregnancy, and by responding to questions at the next consult. Furthermore, given the stable character of parental symptomatology, youth health care professionals should also consistently attend to parental mental health during regular screening visits in the first years after birth. As mothers reported that the main reason for not seeking treatment for their mental health problems during pregnancy is the perception that this is a normal, inevitable part connected to the transition to parenthood (Brown, Bossenbroek, Kluft, Van Tetering, & De Weerth, 2020), these beliefs might not only play a role during pregnancy but also during the first months after birth. Asking parents about their mental health during every consultation could signal to parents that their mental health is important, deserves attention and

might lead to appropriate care if needed. Thus, beyond checking the infant's health and following the infant's growth during regular postnatal care at home (2 weeks after birth) or at the well-baby clinic (at 4, 8, and 12 weeks after birth) specialized nurses also need to be trained to check upon parents' mental health. In other words, screening parental mental health should be part of standard care procedures, both during pregnancy as well as after birth. If parents report (mild) symptomatology, they need to be referred for treatment (such as existing e-health interventions aimed at preventing depression or anxiety symptomatology), and clinicians should be aware of the association between chronic (sub-clinical) maternal symptomatology and child development. By offering interventions already during pregnancy and by attending to parental mental health throughout childhood, parental distress after birth can be prevented, with important benefits for parental as well as children's (future) health and development.

Conclusion

In sum, this dissertation showed that the prevalence of parental distress in community samples is considerable. Maternal levels of distress symptomology are relatively stable over time, and are related to children's internalizing problems in early adolescence. As such, parental distress is not only detrimental for parents' health and well-being, but also for the healthy development of the child. Given this association, it is promising that universal prevention, aimed at all parents regardless of their pre-established risk on developing psychological problems, appears effective in reducing depression, anxiety, and general stress symptomatology. However, existing universal prevention programs show variability in content and delivery, and are relatively extensive. This means that the expected investment from parents, as well as the necessary healthcare resources could become barriers for large-scale implementation. Therefore, our aim was to develop a low-intensity and easy accessible psychoeducational prevention program, which could offer relatively low-cost and easy to implement support to every pregnant woman. While we found no evidence of the effectiveness of the intervention in preventing parenting stress, depression, or anxiety during the first 10 weeks after birth, parents reported that the provision of evidence-based and trustworthy information was of added value to them. This indicates that providing parents with up to date and scientifically validated information might fill a gap in the current available sources of support for expecting parents. As such, increasing attention for translating scientific knowledge into easily accessible information for parents could be a potentially valuable tool in prevention research.

References

Albers, E.M., Beijers, R., Riksen-Walraven, M.J., Sweep, F.C.G.J., & De Weerth, C. (2016). Cortisol levels of infants in center care across the first year of life: links with quality of care and infant temperament, *Stress*, *19*, 8-17. https://doi.org/10.3109/10253890.2015.1089230

Baron, R., Manniën, J., te Velde, S.J., Klomp, T., Hutton, E.K., & Brug, J. (2015). Socio-demographic inequalities across a range of health status indicators and health behaviours among pregnant women in prenatal primary care: a cross-sectional study. *BMC Pregnancy Childbirth*, *15***,** 261. https://doi.org/10.1186/s12884-015-0676-z

Barr, R.G., Kramer, M.S., Boisjoly, C., McVey-White, L., & Pless, I.B. (1988). Parental diary of infant cry and fuss behavior. *Archives of Disease in Childhood*, *63*, 380-387. http://dx.doi.org/10.1136/adc.63.4.380

Barr, R.G. (1990). The normal crying curve: what do we really know? *Developmental Medicine & Child Neurology*, *32*, 356–362. https://doi.org/10.1111/j.1469-8749.1990.tb16949.x

Becker, K.D., & Ginsburg, G.S. (2011). Maternal anxiety, behaviors, and expectations during a behavioral task: relation to children's self-evaluations. *Child Psychiatry and Human Development*, *42***,** 320–333. https://doi.org/10.1007/s10578-011-0216-7

Beijers, R., Daehn, D., Shalev, I., Belsky, J., & De Weerth, C. (2020). Biological embedding of maternal postpartum depressive symptoms: The potential role of cortisol and telomere length. *Biological Psychology*, *150*. https://doi.org/10.1016/j.biopsycho.2019.107809.

Belsky, J. (1997a). Variation in susceptibility to rearing influences: An evolutionary argument. *Psychological Inquiry*, *8*, 182–186. https://doi.org/10.1207/s15327965pli0803_3

Belsky, J. (1997b). Theory Testing, effect-size evaluation, and differential susceptibility to rearing influence: The case of mothering and attachment. *Child Development*, *68*, 598-600. https://doi.org/10.1111/j.1467-8624.1997.tb04221.x

Belsky, J., Pluess, M. (2012). Differential susceptibility to long-term effects of quality of child care on externalizing behavior in adolescence? *International Journal of Behavioral Development*, *36*, 2-10. https://doi.org/10.1177/0165025411406855

Bianchi, R., Schonfeld, I.S., & Laurent, E. (2015). Burnout–depression overlap: A review. *Clinical Psychology Review*, *36*, 28-41. https://doi.org/10.1016/j.cpr.2015.01.004.

Bijl, R., Ravelli, A. & van Zessen, G. (1998). Prevalence of psychiatric disorder in the general population: results of the Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Social Psychiatry and Psychiatric Epidemiology*, *33***,** 587–595. https://doi.org/10.1007/s001270050098

Bögels, S.M., & Brechman-Toussaint, M.L. (2006). Family issues in child anxiety: Attachment, family functioning, parental rearing and beliefs. *Clinical Psychology Review*, *26*, 834-856. https://doi.org/10.1016/j.cpr.2005.08.001.

Brennan, P. A., Hammen, C., Andersen, M. J., Bor, W., Najman, J. M., & Williams, G. M. (2000). Chronicity, severity, and timing of maternal depressive symptoms: Relationships with child outcomes at age 5. *Developmental Psychology, 36*, 759–766. https://doi.org/10.1037/0012-1649.36.6.759

Bridgett, D. J., Burt, N. M., Edwards, E. S., & Deater-Deckard, K. (2015). Intergenerational transmission of self-regulation: A multidisciplinary review and integrative conceptual framework. *Psychological Bulletin, 141*, 602–654. https://doi.org/10.1037/a0038662

Browne, P.D., Bossenbroek, R., Kluft, A., Van Tetering, E.M.A., & De Weerth, C (2020). *Journal of Women's Health*. https://doi.org/10.1089/jwh.2019.8198

Burstein, M., & Ginsburg, G.S. (2010). The effect of parental modeling of anxious behaviors and cognitions in school-aged children: An experimental pilot study. *Behaviour Research and Therapy*, *48*, 506-515. https://doi.org/10.1016/j.brat.2010.02.006.

Chen, Y., Huang, J., Heng-Kien A., Chen, Y. (2019). High risk of depression, anxiety, and poor quality of life among experienced fathers, but not mothers: A prospective longitudinal study. *Journal of Affective Disorders*, *242*, 39-47. https://doi.org/10.1016/j.jad.2018.08.042.

Clatworthy J. (2012). The effectiveness of antenatal interventions to prevent postnatal depression in high-risk women. *Journal of Affective Disorders*, *137*, 25-34. https://doi.org/10.1016/j.jad.2011.02.029

Cole, D. A., Martin, N. C., & Steiger, J. H. (2005). Empirical and conceptual problems with longitudinal trait-state models: Introducing a trait-state-occasion model. *Psychological Methods, 10,* 3–20. http://dx.doi.org/10.1037/1082-989X.10.1.3

Crnic, K.A., Gaze, C. and Hoffman, C. (2005). Cumulative parenting stress across the preschool period: relations to maternal parenting and child behaviour at age 5. *Infant and Child Development*, *14*, 117-132. http://dx.doi.org/10.1002/icd.384

Cuijpers, P. (2003). Examining the effects of prevention programs on the incidence of new cases of mental disorders: the lack of statistical power. *The American Journal of Psychiatry*, *160*, 1385-1391. https://doi.org/10.1176/appi.ajp.160.8.1385

Da Costa, D., Danieli, C., Abrahamowicz, M., Dasgupta, K., Sewitch, M., Lowensteyn, I., & Zelkowitz, P. (2019). A prospective study of postnatal depressive symptoms and associated risk factors in first-time fathers. *Journal of Affective Disorders*, *249*, 371-377. https://doi.org/10.1016/j.jad.2019.02.033.

De Los Reyes, A., & Kazdin, A.E. (2005). Informant discrepancies in the assessment of childhood psychopathology: A critical review, theoretical framework, and recommendations for further study. *Psychological Bulletin*, *131*, 483-509.

Dennis, C.L., Falah-Hassani, K, Brown, H.K., Vigod, S.N. (2016). Identifying women at risk for postpartum anxiety: a prospective population-based study. *Acta Psychiatrica Scandinavica*, *134*, 485-493. https://doi.org/10.1111/acps.12648

Dennis, C., Falah-Hassani, K., & Shiri, R. (2017). Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis. *The British Journal of Psychiatry*, *210*, 315-323. https://doi.org/10.1192/bjp.bp.116.187179

De Rosnay, M., Cooper, P.J., Tsigaras, N., & Murray, L. (2006). Transmission of social anxiety from mother to infant: An experimental study using a social referencing paradigm. *Behaviour Research and Therapy*, 44, 1165-1175. https://doi.org/10.1016/j.brat.2005.09.003.

Donker, T., Griffiths, K.M., Cuijpers, P., & Christensen, H. (2009). Psychoeducation for anxiety, depression, and psychological distress: a meta-analysis. *BMC Medicine*, *7*, 79. https://doi.org/10.1186/1741-7015-7-79

Evans K, Morrell, C.J., & Spiby, H. (2018). Systematic review and meta-analysis of non-pharmalogical interventions to reduce the symptoms of mild to moderate anxiety in pregnant women. *Journal of Advanced Nursing*, *74*, 289-309. https://doi.org/10.1111/jan.13456

Feinberg, M.E., & Kan, M.L. (2008). Establishing family foundations: Intervention effects on coparenting, parent/infant well-being, and parent-child relations. *Journal of Family Psychology*, *22*, 253-263. https://doi.org/10.1037/0893-3200.22.2.253

Feldman, R. (2007). Parent–infant synchrony and the construction of shared timing; physiological precursors, developmental outcomes, and risk conditions. *Journal of Child Psychology and Psychiatry*, *48*, 329-354. https://doi.org/10.1111/j.1469-7610.2006.01701.x

Fergusson, D.M., Lynskey, M.T. & Horwood, L.J. (1993). The effect of maternal depression on maternal ratings of child behavior. *Journal of Abnormal Child Psychology, 21***,** 245–269. https://doi.org/10.1007/BF00917534

Field, T. (2018). Postnatal anxiety prevalence, predictors, and effects on development: a narrative review. *Infant Behavior and Development*, *51*, 24-32. https://doi.org/10.1016/j.infbeh.2018.02.005.

Fisak, B., & Grills-Tacquechel, A.E. (2007). Parental modeling, reinforcement, and information transfer: risk factors in the development of child anxiety? *Clinical Child and Family Psychology Review*, *10*, 213-231. https://doi.org/10.1007/s10567-007-0020-x

Gerlsma, C., Emmelkamp, P.M.G., Arrindell, W.A. (1990). Anxiety, depression, and perception of early parenting: a meta-analysis. *Clinical Psychology Review*, *10*, 251-277. https://doi.org/10.1016/0272-7358(90)90062-F.

Gerull, F.C., & Rapee, R.M.(2002). Mother knows best: effects of maternal modelling on the acquisition of fear and avoidance behaviour in toddlers. *Behaviour Research and Therapy*, *40*, 279-287. https://doi.org/10.1016/S0005-7967(01)00013-4.

Ghassabian, A., Herba, C.M., Roza, S.J., Govaert, P., Schenk, J.J., Jaddoe, V.W., Hofman, A., White, T., Verhulst, F.C., & Tiemeier, H. (2012). Infant brain structures, executive function, and attention deficit/hyperactivity problems at preschool age. A prospective study. *Journal of Child Psychology and Psychiatry*, *54*, 96-104. https://doi.org/10.1111/j.1469-7610.2012.02590.x

Giallo, R., D'Esposito, F., Cooklin, A., Mensah, F., Lucas, N., Wade, C., Nicholson, J.M. (2013). Psychosocial risk factors associated with fathers' mental health in the postnatal period: results from a population-based study. *Social Psychiatry and Psychiatric Epidemiology*, *48*, 563–573. https://doi.org/10.1007/s00127-012-0568-8

Goodman, A., Lamping, D.L. & Ploubidis, G.B. (2010). When to use broader internalising and externalising subscales instead of the hypothesised five subscales on the Strengths and Difficulties Questionnaire

(SDQ): Data from British Parents, Teachers and Children. *Journal of Abnormal Child Psychology*, *38*, 1179–119. https://doi.org/10.1007/s10802-010-9434-x

Goodman, S.H., Rouse, M.H., Connell, A.M., Robbins Broth, M., Hall, C.M., & Heyward, D. (2011). Maternal depression and child psychopathology: A meta-analytic review. *Clinical Child Family Psychology Review*, *14*, 1-27.

Graham, J.E., Christian, L.M. & Kiecolt-Glaser, J.K. (2006). Stress, Age, and Immune Function: Toward a Lifespan Approach. *Journal of Behavioral Medicine, 29***,** 389–400 https://doi.org/10.1007/s10865-006-9057-4.

Haga, S.M., Drozd, F., Lisoy, C., Wentzel-Larsen, T., Slining, K. (2019). Mamma Mia – A randomized controlled trial of an internet-based intervention for perinatal depression. *Psychological Medicine*, *49*, 1850-1858. https://doi.org/10.1017/S0033291718002544

Henshaw, E.J., Cooper, M.A., Jaramillo, M., Lamp, M.N., Jones, A.L., & Wood, T.L. (2018). "Trying to figure out if you are doing things right, and where to get the info": Parents recall information and support needed during the first 6 weeks postpartum. *Maternal and Child Health Journal*, *22*, 1668-1675. https://doi.org/10.1007/s10995-018-2565-3

Hentges, R.F., Graham, S.A., Fearon, P., Tough, S., & Madigan, S. (2020). The chronicity and timing of prenatal and antenatal maternal depression and anxiety on child outcomes at age 5. *Depression & Anxiety*, 37, 576– 586. https://doi.org/10.1002/da.23039

Heron, J., O'Connor, T.G., Evans, J., Golding, J., & Glover, V. (2004). The course of anxiety and depression through pregnancy and the postpartum in a community sample. *Journal of Affective Disorders*, *80*, 65-73. https://doi.org/10.1016/j.jad.2003.08.004

Hiscock, H.A., Cook, F., Bayer, J., Le, H., Mensah, F., Cann, W., Symon, B., & St. James-Roberts, I. (2014). Preventing early infant sleep and crying problems and postnatal depression: a randomized trial. *Pediatrics*, *133*, 346–54. https://doi.org/10.1542/peds.2013-1886

Hong Law, K., Dimmock, J., Guelfi, K.J., Nguyen, T., Gucciardi, D., Jackson, B. (2019). Stress, depressive symptoms, and maternal self-efficacy in first-time mothers: modelling and predicting change across the first six months of motherhood. *Applied Psychology: Health and Well-being*, *11*, 126-147. http://dx.doi.org/10.1111/aphw.12147

Kessler, R. C., Amminger, G. P., Aguilar-Gaxiola, S., Alonso, J., Lee, S., & Ustün, T. B. (2007). Age of onset of mental disorders: a review of recent literature. *Current Opinion in Psychiatry*, *20*, 359–364. https://doi.org/10.1097/YCO.0b013e32816ebc8c

Kiecolt-Glaser, J.K., McGuire, L., Robles, T.F., & Glaser, R. (2002). Emotions, Morbidity, and Mortality: New Perspectives from Psychoneuroimmunology. *Annual Review of Psychology*, *53*, 83-107. https://doi.org/10.1146/annurev.psych.53.100901.135217

King, A.P., Muzik, M., Hamilton, L., Taylor, A.B., Rosenblum, K.L., Liberzon, I. (2016) Dopamine Receptor Gene DRD4 7-Repeat Allele X Maternal Sensitivity Interaction on Child Externalizing Behavior Problems: Independent Replication of Effects at 18 Months. *Plos One*, *11*, e0160473. https://doi.org/10.1371/journal.pone.0160473

Kingston, D., Kehler, H., Austin, M. P., Mughal, M. K., Wajid, A., Vermeyden, L., Benzies, K., Brown, S., Stuart, S., & Giallo, R. (2018). Trajectories of maternal depressive symptoms during pregnancy and the first 12 months postpartum and child externalizing and internalizing behavior at three years. *PLoS ONE*, *13*, e0195365. https://doi.org/10.1371/journal.pone.0195365

Kiviruusu O, Pietikäinen, J.T., Kylliäinen, A., Pölkki, P., Saarenpää-Heikkilä, O., Marttunen, M., Paunio, T., & Paavonen, J.E. (2020). Trajectories of mothers' and fathers' depressive symptoms from pregnancy to 24 months postpartum. *Journal of Affective Disorders*, *260*, 629-637.

Kontos, E., Blake, K.D., Chou, W.Y.S., & Prestin, A. (2014). Predictors of eHealth usage: Insights on the digital divide from the health information National Trends Survey 2012. *Journal of Medical Internet Research*, 16. http://dx.doi.org/10.2196/jmir.3117

Koss, K.J., & Gunnar, M.R. (2018). Annual research review: Early adversity, the hypothalamic–pituitary–adrenocortical axis, and child psychopathology. *Journal of Child Psychology and Psychiatry*, *59*, 327–346. http://dx.doi.org/10.1111/jcpp.12784

Koutsimani, P., Montgomery, A., & Georganta, K. (2019). The relationship between burnout, depression, and anxiety: A systematic review and meta-analysis. *Frontiers in Psychology, 10*, 284. https://doi.org/10.3389/fpsyg.2019.00284

Leigh, B., & Milgrom, J. (2008). Risk factors for antenatal depression, postnatal depression, and parenting stress. *BMC Psychiatry*, *8*, 24. https://doi.org/10.1186/1471-244X-8-24\

Mao, H., Li, H., Chiu, H., Chan, W., & Chen, S. (2012). Effectiveness of antenatal emotional self-management training program in the prevention of postnatal depression in Chinese women. *Perspectives in Psychiatric Care*, *48*, 218-224. https://doi.org/10.1111/j.1744-6163.2012.00331.x

Maslach, C., Jackson, S.E., & Leiter, M.P. (1996). MBI: Maslach Burnout Inventory. Sunnyvale, CA: CPP, Incorporated.

Matthey, S., Barnett, B., Howie, P., & Kavanagh, D.J. (2003). Diagnosing postpartum depression in mothers and fathers: whatever happened to anxiety? *Journal of Affective Disorders*, *74*, 139-47. https://doi.org/10.1016/S0165-0327(02)00012-5

Meaney, M.J. (2018). Perinatal maternal depressive symptoms as an issue for population health. *The American Journal of Psychology*, *175*, 1084-1093. https://doi.org/10.1176/appi.ajp.2018.17091031

Miner, J. L., & Clarke-Stewart, K. A. (2008). Trajectories of externalizing behavior from age 2 to age 9: Relations with gender, temperament, ethnicity, parenting, and rater. *Developmental Psychology, 44*, 771–786.

McCoy, S.J., Beal, J.M., Shipman, S.B., Payton, M.E., & Watson, G.H. (2006). Risk factors for postpartum depression: A retrospective investigation at 4-weeks postnatal and a review of the literature. *Journal of the American Osteopathic Association*, *106*, 193-198.

McFarland, DH, Fortin, AJ, Polka, L. (2020). Physiological measures of mother–infant interactional synchrony. *Developmental Psychobiology*, *62*, 50– 61. https://doi.org/10.1002/dev.21913

Morawska, A., Dittman, C.K. & Rusby, J.C. (2019). Promoting Self-Regulation in Young Children: The Role of Parenting Interventions. *Clinical Child and Family Psychology Review, 22*, 43–51. https://doi.org/10.1007/s10567-019-00281-5

Morris-Rush, J.K., Freda, M., Bernstein, P.S. (2003). Screening for postpartum depression in an inner-city population. *American Journal of Obstetrics and Gynecology*, *188*, 1217-1219. https://doi.org/10.1067/mob.2003.279

Morsbach, S.K., & Prinz, R.J. (2006). Understanding and improving the validity of self-report of parenting. *Clinical Child and Family Psychology Review*, *9*, 1–21. https://doi.org/10.1007/s10567-006-0001-5

Murray, L., Woolgar, M., Cooper, P. and Hipwell, A. (2001), Cognitive vulnerability to depression in 5-year-old children of depressed mothers. *Journal of Child Psychology and Psychiatry*, *42*, 891-899. https://doi.org/10.1111/1469-7610.00785

Murray, L., Fearon, P., Cooper, P. (2015). Postnatal depression, mother-infant interactions, and child development - prospects for screening and treatment. In J. Milgrom & A. Gemmill (Eds.), *Identifying Perinatal Depression and Anxiety: Evidence-based Practice in Screening, Psychosocial Assessment and Management* (pp. 139-164). Wiley Blackwell: Oxford.

Netsi, E., Pearson, R.M., Murray, L., Cooper, P., Craske, M.G., & Stein, A. (2018). Association of persistent and severe postnatal depression with child outcomes. *JAMA Psychiatry, 75*, 247–253. doi:10.1001/jamapsychiatry.2017.4363

O'Hara, M.W., & Swain, A.M. (1996) Rates and risk of postpartum depression—a meta-analysis. *International Review of Psychiatry*, *8*, 37-54. https://doi.org/10.3109/09540269609037816

Osher, D., Cantor, P., Berg, J., Steyer, L., Rose, T. (2020). Drivers of human development: How relationships and context shape learning and development. *Applied Developmental Science*, *24*, 6-36. https://doi.org/10.1080/10888691.2017.1398650

Paulson, J.F., Dauber, S., Leiferman, J.A. (2006). Individual and combined effects of postpartum depression in mothers and fathers on parenting behavior. *Pediatrics*, *118*, 659-668. https://doi.org/10.1542/peds.2005-2948

Perry, N. B., Dollar, J. M., Calkins, S. D., Keane, S. P., & Shanahan, L. (2018). Childhood self-regulation as a mechanism through which early overcontrolling parenting is associated with adjustment in preadolescence. *Developmental Psychology, 54*, 1542–1554. https://doi.org/10.1037/dev0000536

Priel, A., Djalovski, A., Zagoory-Sharon, O. and Feldman, R. (2019). Maternal depression impacts child psychopathology across the first decade of life: Oxytocin and synchrony as markers of resilience. *The Journal of Child Psychology and Psychiatry*, *60*, 30-42. doi:10.1111/jcpp.12880

Rao, W., Zhu, X., Zong, Q., Zhang, Q., Hall, B.J., Ungvari, G.S., & Xiang, Y. (2020). Prevalence of prenatal and postpartum depression in fathers: A comprehensive meta-analysis of observational surveys. *Journal of Affective Disorders*, *263*, 491-499. https://doi.org/10.1016/j.jad.2019.10.030.

Righetti-Veltema, M., Conne-Perréard, E., Bousquet, A., & Manzano, J. (1998). Risk factors and predictive signs of postpartum depression. *Journal of Affective Disorders*, *49*, 167-180. https://doi.org/10.1016/S0165-0327(97)00110-9.

Robertson, E., Grace, S., Wallington, T., & Stewart, D.E. (2004). Antenatal risk factors for postpartum depression: a synthesis of recent literature. *General Hospital Psychiatry*, *26*, 289-295. https://doi.org/10.1016/j.genhosppsych.2004.02.006.

Roskam, I., Brianda, M., & Mikolajczak, M. (2018). A step forward in the conceptualization and measurement of parental burnout: The Parental Burnout Assessment (PBA). *Frontiers in Psychology*, *9*, 758. https://doi.org/10.3389/fpsyg.2018.00758

Roza, S.J., Govaert, P.P., Vrooman, H.A., Lequin, M.H., Hofman, A., Steegers, E.A.P., Moll, H.A., Jaddoe, V.W.V., Verhulst, F.C., & Teimeier, H. (2008). Foetal growth determines cerebral ventricular volume in infants: The Generation R Study. *NeuroImage*, *39*, 1491-1498. https://doi.org/10.1016/j.neuroimage.2007.11.004

Séjourné, N., Sanchez-Rodriguez, R., Leboullenger, A., & Callahan, S. (2018). Maternal burn-out: an exploratory study, *Journal of Reproductive and Infant Psychology*, *36*, 276-288. https://doi.org/10.1080/02646838.2018.1437896

Silverman, M.E., Reichenberg, A, Savitz, D.A., Cnattingius, S., Lichtenstein, P., Hultman, C.M., Larsson, H, & Sandin, S. (2017). The risk factors for postpartum depression: A population-based study. *Depression & Anxiety*, *34*, 178– 187. https://doi.org/10.1002/da.22597.

Sockol, L.E., Epperson, C.N., Barber, J.P. (2013). Preventing postpartum depression: a meta-analytic review. *Clinical Psychology Review*, *33*, 1205-1217. https://doi.org/10.1016/j.cpr.2013.10.004

Sockol, L.E. (2015). A systematic review of the efficacy of cognitive behavioral therapy for treating and preventing perinatal depression. *Journal of Affective Disorders*, *177*, 7-21. https://doi.org/10.1016/j.jad.2015.01.052

Sockol LE. (2018). A systematic review and meta-analysis of interpersonal psychotherapy for perinatal women. *Journal of Affective Disorders*, *232*, 316-328. https://doi.org/10.1016/j.jad.2018.01.018

Sroufe, A.L. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. 2005: *Attachment & Human Development*, *7*, 349-367.

Stein, A., Pearson, R.M., Goodman, S.H., Rapa, E., Rahman, A., McCallum, M., Howard, L.M., & Pariante, C.M. (2014). Effects of perinatal mental disorders on the fetus and child. *The Lancet*, *384*, 1800-1819. https://doi.org/10.1016/S0140-6736(14)61277-0

Underwood, L., Waldie, K.E., Peterson, E., D'Souza, S., Verbiest, M., McDaid, F., & Morton, S. (2017). Paternal depression symptoms during pregnancy and after childbirth among participants in the growing up in New Zealand study. *JAMA Psychiatry, 74*, 360–369. https://doi.org/doi:10.1001/jamapsychiatry.2016.4234

Wenzel, A., Haugen, E.N., Jackson, L.C., & Brendle, J.R. (2005). Anxiety symptoms and disorders at eight weeks postpartum. *Journal of Anxiety Disorders*, *19*, 295-311. https://doi.org/10.1016/j.janxdis.2004.04.001.

Windhorst, D.A., Mileva-Seitz, V.R., Linting, M., Hofman, A., Jaddoe, V.W., Verhulst, F.C., Tiemeier, H., van IJzendoorn, M.H. and Bakermans-Kranenburg, M.J. (2015). Differential susceptibility in a developmental perspective: DRD4 and maternal sensitivity predicting externalizing behavior. *Developmental Psychobiology*, *57*, 35-49. https://doi.org/10.1002/dev.21257

Chen, Y., Huang, J., Heng-Kien A., Chen, Y. (2019). High risk of depression, anxiety, and poor quality of life among experienced fathers, but not mothers: A prospective longitudinal study. *Journal of Affective Disorders*, *242*, 39-47. https://doi.org/10.1016/j.jad.2018.08.042.

Young C, Roberts R, Ward L. (2020). Hindering resilience in the transition to parenthood: a thematic analysis of parents' perspectives. *Journal of Reproductive and Infant Psychology.* https://doi.org/10.1080/02646838.2020.1757630

Addendum

Summary

Dutch summary – Samenvatting

Acknowledgements – Dankwoord

About the author

List of Publications

Summary

Introduction

The transition to parenthood is a major life event, often accompanied by much joy and happiness, but also challenging parents' available resources and coping skills. Parental distress can not only jeopardize parents' own health, but also the health and well-being of their children. This dissertation focuses on parental distress during the transition to parenthood and has two main aims. The first aim is to **describe** parental distress postpartum among a universal population of parents, thus parents without existing psychopathology or risk factors for developing distress (Chapters 2 & 3). Next to identifying potential sources of parental distress, this dissertation focuses on how this distress develops longitudinally across early and middle childhood and how it is related to child development (Chapter 3). The second aim is to study whether parental postpartum distress can be **prevented**. Existing interventions are systematically reviewed and meta-analyzed (Chapter 4), and based on the conclusions of this meta-analysis, a psychoeducational prevention program has been developed and tested in a randomized controlled trial (Chapters 5 & 6). As the focus in previous research has been mainly on mothers, a third aim of this dissertation was to include the experiences of fathers.

Part I: Parental distress

Chapter 2 focuses on a relatively understudied form of postpartum parental distress, namely maternal burnout symptomatology. Using structural equation modeling, we examined parenting appraisals (stress and satisfaction with regard to the parental role) as potential predictors of burnout symptomatology in a sample of 260 mothers with children up to four years of age. Furthermore, we developed a new scale to measure satisfaction with substitute childcare and included satisfaction with professional childcare arrangements as a predictor in the model. Results showed that 10% of mothers suffered from symptoms of one of the core dimensions of burnout, namely exhaustion. Furthermore, mothers' appraisal of their role as a parent was associated with burn-out symptomatology through the experience of home-work conflict and facilitation. Mothers who appraised their new role more negatively, experienced higher levels of conflict between the home and work domains, and more symptoms of burnout. In contrast, for mothers who were more satisfied with their role, the home and work domains seemed to facilitate each other more, and they experienced less burnout symptomatology. Importantly, satisfaction with childcare arrangements was related to burnout

symptomatology through parenting stress and satisfaction. This study contributes to existing research by identifying potential predictors of maternal distress symptomatology which relate to the adaptation process to parenthood and the changes in the home situation that are connected to the transition to parenthood.

In *Chapter 3*, we report on a prospective longitudinal study aiming to investigate the associations between anxiety and depression symptomatology in a community sample of 193 mothers across the first 12.5 years of parenthood, and children's internalizing and externalizing problems. Mothers reported on their depression and anxiety symptomatology at the child's age of 3, 6, and 12 months, and at 2.5, 4, 6, 8, 10 and 12.5 years. At 12.5 years of age, both mothers and children reported on children's internalizing and externalizing problems. Trait-state occasion modeling was used to disentangle the chronic (trait) variance in maternal symptomatology from the transient (occasion-specific) variance. Results showed that, on average, 66.6 % of the variance in maternal anxiety and depression symptomatology could be explained by the chronic trait factor. For both anxiety and depression, the chronic variance in maternal symptomatology was related to children's internalizing problems as reported by the mother. Also for child-reported internalizing problems, a significant association with chronic maternal anxiety and depression symptomatology emerged. The occasion-specific variance in maternal depression symptomatology was marginally related to mother-reported internalizing problems at the child's age of 12.5 years only. Given that chronic sub-clinical symptomatology seems to be associated with children's internalizing problems, this study showed that prevention and treatment of maternal anxiety and depression symptomatology might be worthwhile, regardless of the severity of maternal symptoms.

Part II: Interventions to prevent parental distress

In *Chapter 4*, the available evidence with regard to effectiveness of preventive interventions offered to *universal* populations of pregnant women on symptoms of depression, anxiety, and general stress is systematically reviewed and meta-analyzed. We included 12 universal prevention studies in the meta-analysis, incorporating a total of 2,559 pregnant women. We calculated a pooled effect size, thereby combining depression, anxiety, stress in one distress measure. The analysis showed a significant but moderate effect of universal prevention on this combined measure of distress (d=.52), as well as on the separate measures of depressive symptomology (d=.50) and general stress (d=.52); the effect on anxiety (d=.30) was smaller. Only two universal prevention studies did include the partner

in the intervention and assessed the partner's distress outcomes. Also, only one study focused on infant outcomes beyond pregnancy and the delivery. This means that the number of studies including partner and/or infant outcomes was too low to assess their effectiveness. However, our overall results indicate that, next to indicated and selected prevention, universally applied interventions can be valuable in preventing distress symptomatology. Instead of only targeting at-risk women, preventive interventions should therefore be offered to all pregnant women. Given the variety in interventions, more research is needed on which elements of universal prevention work and on preventing other types of maternal distress beyond depression. Furthermore, future trials are recommended to also incorporate the partner in the interventions an to assess the partner's distress outcomes. Moreover, as maternal distress symptoms can affect infant development, it is important to investigate whether the positive effects of the universally applied interventions extend from mother to infant.

Chapters 5 & 6 report on the development and testing of a low-intensity psychoeducational prevention program. The goal of the intervention is to prevent postpartum parenting stress (parenting stress, depression, and anxiety), to enhance parental well-being, and to improve caregiving quality (breastfeeding, room-sharing, and bonding). Between 26-34 weeks of pregnancy, 138 pregnant women and 96 partners were randomized to the intervention or a waitlist control group. The intervention consisted of an information booklet, a video, a prenatal home visit, and a postnatal telephone call. The information included in the intervention focused on the first months after birth and covered four main topics namely (1) sensitive responsiveness, adapting to the parental role, and attending to own needs; (2) infant crying patterns and soothing techniques; (3) the infant's hunger signals and feeding arrangements; and (4) sleeping patterns and sleeping arrangements. During the home visit and the phone call, the provided information was discussed and parents were given the opportunity to ask questions. Both the intervention and the control group showed a rise in distress after birth. No significant differences on the included distress outcomes between both groups could be observed. However, parents rated the provided information as useful and of added value. Thus, the intervention seemed to fill a gap in the information and tools that are currently available for parents-to-be but does not seem to be effective in preventing postpartum distress or in increasing caregiving quality. There might have been an effect which we were not able to demonstrate (because of the relatively short period of follow-up, the lack of observational measures, and the homogeneity of our sample). It might also be that intensification of the intervention is necessary to be effective on parental distress. This should be demonstrated in future research. Given that parental distress symptomatology and parental caregiving quality after birth can affect infant development, detecting effective ways of intervening in an early stage -thus already during pregnancy- is of vital importance for parent's as well as children's health and development.

General discussion

Studying parental distress is important from both a parental as well as child health perspective. In this dissertation, we focused on describing and preventing parental distress, thereby including both mothers and fathers. Results showed **a relatively high prevalence** of maternal symptomatology after birth, which has **a chronic character** (Chapters 2 & 3), and **is associated with children's internalizing problems** in early adolescence (Chapter 3). **Universal prevention** – aimed at all pregnant women – **seems to be effective** in preventing maternal depression, anxiety, and stress (Chapter 4). However, the included interventions asked for a relatively high amount of effort from mothers as well as facilitators, which makes them expensive, potentially hindering the large-scale implementation necessary for universal prevention. Therefore, we aimed to develop **a low-intensity psychoeducational prevention program**, which could be implemented at a relatively low cost (Chapters 5 & 6). We found **no evidence of the effectiveness of this intervention** as stand-alone treatment in preventing parental distress and enhancing caregiving quality. Since **parents did consider the received information useful and valuable**, we recommend offering the information booklet as part of routine care for pregnant women and their partner. More research into the effectiveness of easy to implement and low-cost universal prevention on parenting distress is necessary, focusing on: 1) the inclusion of partners and the tailoring of interventions to the potential different needs of mothers and fathers; 2) the inclusion of (observational) outcomes with regard to parent-infant interaction to determine the effectiveness of interventions on parents' sensitive responsiveness, parent-infant synchrony and subsequent child development; 3) the effect of universal prevention of parental distress on children's behavior and development observed over longer periods of time and at different levels (i.e. social and cognitive); 4) other measures of parental distress beyond depression; and 5) the effectiveness of low-intensity universal prevention programs among parents varying in demographic characteristics and psychosocial history. Importantly, providing parents with up to date and scientifically validated information about the first months postpartum might fill a gap in the current available sources of support for expecting parents. Therefore, increasing attention for translating scientific knowledge into easily accessible information for parents could be a potentially valuable tool in the prevention of parental distress.

Dutch summary – Samenvatting

Inleiding

Het krijgen van een eerste kindje is een ingrijpende levensgebeurtenis, die gepaard gaat met gevoelens van geluk en blijheid. Tegelijkertijd stelt de nieuwe rol ouders ook op de proef. Stress bedreigt niet alleen de gezondheid en het welzijn van ouders zelf, maar ook die van hun kind. Dit proefschrift richt zich daarom op verschillende vormen van stress bij aanstaande ouders en heeft twee hoofddoelen. Het eerste doel is om de verschillende vormen van ouderschapsstress na de geboorte te **beschrijven** bij een universele populatie van ouders, dat wil zeggen, ouders zonder psychische aandoeningen of risicofactoren om symptomen van stress te ontwikkelen (Hoofstuk 2 & 3). Naast het identificeren van mogelijke bronnen van ouderschapsstress, richt dit proefschrift zich ook op hoe deze stress zich ontwikkelt gedurende de eerste jaren van het ouderschap en hoe deze gerelateerd is aan de ontwikkeling van kinderen (Hoofdstuk 3). Het tweede doel is om te onderzoeken of ouderschapsstress na de geboorte **voorkomen** kan worden. Het huidige aanbod van interventies wordt systematisch beschreven en geanalyseerd (Hoofdstuk 4). Gebaseerd op de conclusies van deze meta-analyse wordt een preventieprogramma gericht op psycho-educatie ontwikkeld en getest in een gerandomiseerd onderzoek met controlegroep (Hoofdstuk 5 & 6). Aangezien eerder onderzoek vooral op moeders gericht was, is een bijkomend doel van dit proefschrift om ook de ervaringen van vaders mee te nemen.

Deel I: Ouderschapsstress

Hoofdstuk 2 is gericht op een nog weinig bestudeerde vorm van ouderschapsstress: burn-out onder moeders. We hebben, door middel van het modelleren van structurele vergelijkingen, onderzocht of stress en voldoening gerelateerd aan het ouderschap voorspellers zijn van symptomen van burn-out. De steekproef bevatte 260 moeders met kinderen van nul tot vier jaar oud. Daarnaast hebben we een nieuw instrument ontwikkeld om tevredenheid met kinderopvang te meten. Tevredenheid met kinderopvang is tevens als voorspeller in het model opgenomen. De resultaten van deze studie lieten zien dat 10% van de moeders klachten van uitputting rapporteerde, één van de belangrijkste aspecten van burn-out. Verder bleek dat hoe moeders hun rol als ouder ervaarden gerelateerd was aan burn-out: moeders die negatiever waren over hun nieuwe rol, ervaarden meer conflict tussen hun thuis- en werkomgevingen en rapporteerden meer symptomen van burn-out. Echter, bij moeders die tevredener waren met hun rol leken de thuis- en werksituaties elkaar positief te beïnvloeden. Deze

moeders ervaarden minder klachten passend bij burn-out. Deze studie draagt bij aan bestaand onderzoek door potentiële voorspellers van burn-out onder moeders te identificeren die gerelateerd zijn aan het aanpassingsproces aan het ouderschap en de veranderingen in de thuissituatie die gepaard gaan met de overgang naar het ouderschap.

In *Hoofdstuk 3* rapporteren we de resultaten van een longitudinale studie onder 193 moeders gedurende de eerste 12.5 jaar van het ouderschap. We bestuderen het verband tussen symptomen van angst en depressie enerzijds en internaliserende (bijvoorbeeld symptomen van angst en depressie)en externaliserende problemen (bijvoorbeeld agressief en opstandig gedrag) van kinderen anderzijds. In deze studie rapporteerden de moeders in welke mate zij symptomen van depressie en angst ervaarden toen hun kind 3, 6, en 12 maanden oud was, en vervolgens weer toen hun kind 2,5; 4; 6; 8; 10; en 12.5 jaar oud was. Op de leeftijd van 12,5 jaar hebben zowel moeders als kinderen een vragenlijst over mogelijke internaliserende en externaliserende problematiek van het kind ingevuld. Via trait-state occasion modeling hebben we chronische (trait) symptomen van de moeder gescheiden van symptomen van voorbijgaande aard (occasion). De resultaten van deze studie lieten zien dat gemiddeld 66.6% van de variantie in angst en depressie van de moeder chronisch is. Voor zowel angst als depressie was variantie in chronische symptomen van moeders gerelateerd aan internaliserende problematiek van het kind zoals gerapporteerd door de moeder. Ook voor internaliserende problematiek gerapporteerd door het kind werd dit verband met chronische symptomen van angst en depressie van de moeder gevonden. Voorbijgaande symptomen van depressie van de moeder waren marginaal gerelateerd aan internaliserende problematiek van het kind op 12.5-jarige leeftijd (zoals gerapporteerd door de moeder). Dus, chronische, subklinische symptomen van angst en depressie lijken gerelateerd te zijn aan internaliserende problematiek van het kind. Dit betekent dat de preventie en behandeling van symptomen van angst en depressie bij de moeder waardevol kan zijn, onafhankelijk van de ernst van deze symptomen.

Deel II: Interventies ter preventie van ouderschapsstress

In *Hoofdstuk 4* wordt het beschikbare bewijs met betrekking tot de effectiviteit van preventieve interventies om symptomen van depressie, angst, en stress na de bevalling te voorkomen systematisch verzameld en geanalyseerd. Daarbij hebben we ons gericht op interventies die aangeboden worden aan universele populaties van zwangere vrouwen. Twaalf studies voldeden aan de inclusiecriteria, met in totaal 2559 zwangere vrouwen. Op basis van de resultaten van de individuele studies hebben we een effectgrootte berekend voor het totaal van de gecombineerde steekproeven, waarbij we depressie, angst, en stress in één uitkomstmaat gecombineerd hebben. Deze analyse liet een significant maar matig sterk effect zien van universele preventie (*d*=.52). Dit effect was vergelijkbaar voor de afzonderlijke uitkomstmaten depressie (*d*=.50) en stress (*d*=.52). Het effect van universele preventie op angst (*d*=.30) was kleiner.

Slechts twee universele preventiestudies richtten de interventie ook op de partner en bestudeerden daarbij de stress van de partner. Ook richtte slechts één studie zich op uitkomsten bij het kind na de geboorte. Dit betekent dat het aantal studies dat uitkomsten voor de partner en/of het kind bestudeerde te laag was om de effectiviteit in te kunnen schatten. Onze resultaten wijzen er echter op dat, naast gerichte preventie bij risicogroepen, ook universele preventie waardevol kan zijn in het voorkomen van symptomen van stress. In plaats van het alleen aanbieden van interventies aan vrouwen die risico lopen op stress na de geboorte, zouden preventieve interventies daarom aangeboden moeten worden aan alle zwangere vrouwen.

Vanwege de grote inhoudelijke verschillen is meer onderzoek nodig naar welke elementen van universele preventies werkzaam zijn. Er is ook meer onderzoek nodig naar de preventie van andere vormen van ouderschapsstress dan alleen depressie. Toekomstige studies wordt aanbevolen om de partner op te nemen in de interventie en ook het effect van de interventie op ouderschapsstress bij de partner te meten. Bovendien is het, gezien het risico dat ouderschapsstress voor de ontwikkeling van kinderen vormt, belangrijk om te onderzoeken of de positieve effecten van universele preventies op de gezondheid van de moeder ook overgedragen worden op het kind.

Hoofdstuk 5 en 6 beschrijven de ontwikkeling en het testen van een laagdrempelig interventieprogramma gericht op psycho-educatie. Het doel van deze interventie is om stress bij ouders na de geboorte te voorkomen en daardoor het welzijn van ouders en de kwaliteit van de door hen geboden zorg (borstvoeding, samen slapen, en gehechtheid) te verbeteren. Tussen de 26^{e} en de

34e week van hun zwangerschap zijn 138 vrouwen en 96 partners gerandomiseerd toegewezen aan de interventiegroep of aan een (wachtlijst)controlegroep.

De interventie bestond uit een informatieboekje, een video, een prenataal huisbezoek, en een postnataal telefoongesprek. De aangeboden informatie richtte zich op de eerste maanden na de geboorte en bestond uit vier hoofdthema's namelijk:

1. sensitieve responsiviteit, aanpassen aan het ouderschap, en aandacht voor de eigen behoeften;
2. huilpatronen van baby's en manieren om te troosten;
3. hongersignalen van baby's en voedingsgewoonten; en
4. slaappatronen en slaapgewoonten.

Deze informatie werd zowel tijdens het huisbezoek als het telefoongesprek besproken en ouders werd de gelegenheid geboden om vragen te stellen. Zowel de interventie- als de controlegroep liet een toename in stress zien na de geboorte. Er waren geen significante verschillen tussen beide groepen op de geïncludeerde uitkomstmaten. Ouders beoordeelden de aangeboden informatie echter als nuttig en waardevol. Dus, vergeleken met de informatie en steun die op dit moment beschikbaar is voor aanstaande ouders, leek de interventie wel degelijk toegevoegde waarde te hebben ondanks dat deze niet meetbaar effectief was in het verminderen van stress en het verhogen van de kwaliteit van zorg.

Het is mogelijk dat er wel een effect was van de interventie, maar dat dit effect in deze studie niet aangetoond kon worden (bijvoorbeeld vanwege de relatief korte follow-up periode, het gebrek aan observationele uitkomstmaten of de relatief homogene steekproef). Het is ook mogelijk dat een intensievere interventie noodzakelijk is om daadwerkelijk een effect op ouderschapsstress te bewerkstelligen. Toekomstig onderzoek moet dit uitwijzen. Dit is van belang, omdat symptomen van ouderschapsstress en een verminderde kwaliteit van zorg na de geboorte de gezondheid en ontwikkeling van kinderen negatief kunnen beïnvloeden. Het ontdekken van effectieve manieren om al in een vroeg stadium – bij voorkeur gedurende de zwangerschap - te kunnen interveniëren is daarom essentieel voor zowel het welzijn van de ouders als de gezondheid en ontwikkeling van het kind.

Algemene discussie

Het onderzoeken van ouderschapsstress is belangrijk, zowel vanuit het perspectief van de ouders als dat van het kind. In dit proefschrift hebben we ons gericht op het beschrijven en voorkomen van

ouderschapsstress, bij zowel moeders als vaders. De resultaten van onze studies lieten een **relatief hoge prevalentie** zien van postpartum symptomen bij de moeder. Deze symptomen hadden een **chronisch karakter** (Hoofdstukken 2 & 3), en waren **gerelateerd aan internaliserende problematiek bij kinderen** in de vroege adolescentie (Hoofdstuk 3). **Universele preventie** – gericht op alle zwangere vrouwen – **lijkt effectief te zijn** in het voorkomen van depressie, angst, en stress bij de moeder (Hoofdstuk 4).

De interventies die zijn opgenomen in de meta-analyse vroegen een relatief hoge inspanning van zowel de moeders als de professionals die de interventies leidden. Dit maakt deze interventies duur, wat grootschalige implementatie verhindert. Grootschalige implementatie is juist noodzakelijk voor effectieve universele preventie. Ons doel was daarom om een **laagdrempelig preventieprogramma te ontwikkelen**, dat tegen relatief lage kosten geïmplementeerd zou kunnen worden (hoofdstukken 5 & 6). We hebben **geen bewijs gevonden voor de effectiviteit van deze interventie** in het voorkomen van ouderschapsstress en het verhogen van de kwaliteit van de geboden zorg wanneer deze ingezet wordt zonder de toevoeging van andere vormen van ondersteuning.

Niettemin vonden ouders de **ontvangen informatie nuttig** en van toegevoegde waarde. Daarom is ons advies om het informatieboekje toe te voegen aan de standaardzorg voor zwangere vrouwen en hun partners. Er is meer onderzoek nodig naar de effectiviteit van laagdrempelige universele preventie die geïmplementeerd kan worden tegen relatief lage kosten. De volgende punten zijn hierbij van belang:

1. het aanpassen van interventies op de mogelijk verschillende behoeftes van moeders en vaders;
2. het opnemen van (observationele) uitkomstmaten gericht op de interactie tussen ouders en kind om de effectiviteit van interventies op de mate van sensitiviteit en responsiviteit van ouders, de synchronie tussen ouders en kinderen en de ontwikkeling van kinderen te bepalen;
3. het onderzoeken van het effect van universele preventie van ouderschapsstress op het gedrag en de ontwikkeling van kinderen op de langere termijn en op verschillende niveaus (bijvoorbeeld sociaal en cognitief);
4. het opnemen van andere uitkomstmaten met betrekking tot ouderschapsstress dan enkel en alleen depressie; en
5. het onderzoeken van de effectiviteit van laagdrempelige universele preventieprogramma's bij ouders met verschillende demografische kenmerken en een verschillende psychosociale achtergrond.

Het bieden van recente en wetenschappelijk onderbouwde informatie aan ouders over de eerste maanden na de geboorte lijkt een waardevolle toevoeging te zijn aan de huidige beschikbare steunbronnen voor aanstaande ouders. Het vergroten van de aandacht voor het vertalen van wetenschappelijke kennis in toegankelijke informatie voor ouders kan derhalve een krachtig wapen blijken in het voorkomen van symptomen van ouderschapsstress.

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About the author

Marjolein Anne Missler was born on September 7, 1986 in Utrecht. She completed her secondary education (gymnasium) at Cals College Nieuwegein in 2005. She studied Clinical Psychology at Utrecht University and completed her master's in 2012, cum laude. Her master thesis, supervised by prof. dr. Margaret Stroebe, was awarded with the P.G. Swanborn prize of Utrecht University for "displaying exceptional insight into the theoretical foundation and methods of research in the social sciences". During her studies, her children David (2009) and Emma (2010) were born.

In 2015, she started her PhD project on describing and preventing parental distress at the Clinical Psychology section of the Vrije Universiteit Amsterdam. This project was funded by a talent grant of the Netherlands Organization for Scientific Research (NWO). Her youngest daughter Sophie was born at the start of this project.

All five chapters of her PhD-thesis have been published. In total, Marjolein co-authored nine published papers published in international peer-reviewed journals. Her portfolio of publications is multi-methodological, involving longitudinal and cross-sectional datasets, qualitative and quantitative research methodologies, and has been written in cooperation with an extensive network of co-authors from different disciplines.

After a post-doc position at the WORK-LIFE consortium of the Radboud University, Marjolein is currently appointed as a lecturer at the Psychology department of this university and as a post-doc at the section of Clinical Psychology at the Vrije Universiteit Amsterdam. Marjolein obtained the grant for her post-doc from the Amsterdam Public Health institute. In this project, she collaborates with prof. dr. Annemieke van Straten; prof. dr. Tessa Roseboom (Department of Obstetrics and Gynecology of the University of Amsterdam) and dr. Roseriet Beijers (Radboud University/RadboudUMC). The aim of her post-doc project is to study long-term effects of the psycho-educational prevention program in the original sample with regard to infant development and parental health. From the summer of 2021 onwards, Marjolein will be appointed as an Assistant Professor of Clinical Psychology at Utrecht University.

List of publications

Articles in International Peer-Reviewed Journals

Missler, M.A., Van Straten, A., Denissen, J., Donker, T., De Weerth, C., & Beijers, R. (In press). The first decade of parenthood: a latent trait-state occasion model of the longitudinal association between maternal distress and child well-being. *Developmental Psychology*.

Missler, M.A., Donker, T., Beijers, R., Ciharova, M., Moyse, C., De Vries, R., Denissen, J., & Van Straten, A. (2021). Preventing postpartum maternal distress: a systematic review and meta-analysis of psychological interventions. *BMC Pregnancy and Childbirth*, *21*, 276. https://doi.org/10.1186/s12884-021-03752-2

Missler, M. A., van Straten, A., Denissen, J. Donker, T., & Beijers, R. (2020). Effectiveness of a psycho-educational intervention for expecting parents to prevent postpartum parenting stress, depression and anxiety: a randomized controlled trial. *BMC Pregnancy & Childbirth*, *20*, 658. https://doi.org/10.1186/s12884-020-03341-9

Missler, M.A., Beijers, R., Denissen, J.J.A., & Van Straten, A. (2018). Effectiveness of a psycho- educational intervention to prevent postpartum parental distress and enhance infant well- being: study protocol of a randomized controlled trial. *Trials*, *19*, 4. https://doi.org/10.1186/s13063-017-2348-y

Stroebe, K., & **Missler, M.A.** (2015). A resource pathway to action against discrimination: Explaining lack of action through burnout and work-family balance. *Journal of Community & Applied Social Psychology, 26,* 18-31*.* DOI: 10.1002/casp.2230

IJzerman, H., Coan J.A., Wagemans, F.M.A., **Missler, M.A**., van Beest, I., Lindenberg, S., & Tops, M. (2015). A theory of social thermoregulation in human primates. *Frontiers In Psychology*, *6*, 464–464. doi: 10.3389/fpsyg. 2015.00464

Saan, M.C., Boeije, H.R., Sattoe, J.N.T., Bal, M.I., **Missler, M.A.**, & Van Wesel, F. (2015). Recording and accounting for stakeholder involvement in systematic reviews. *Health Information and Libraries Journal*, *32*, 95-106. https://doi.org/10.1111/hir.12099

Missler, M.A., Stroebe, M.S., & Van der Laan, G. (2014). The work-home interface: The role of home- based predictors of burnout among mothers. *Family Science*, *4*, 148-160. https://doi.org/10.1080/19424620.2013.871740

Missler, M.A., Stroebe, M.S., Geurtsen, L., Mastenbroek, M., Chmoun, S., Van der Houwen, K. (2012). Exploring death anxiety among elderly people: A literature review and empirical investigation. *Journal of Death and Dying*, *64*, 357-379. https://doi.org/10.2190/OM.64.4.e

Other publications (contributions to Dutch newspapers)

Missler, M.A. (July 4th, 2018). Borstvoeding is optimaal. *De Volkskrant*.

Missler, M.A. (December 31st, 2016). Gezinszuiltje. *De Volkskrant.*